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THE EFFECT OF FOREIGN DIRECT INVESTMENTS ON PRODUCTIVITY IN ESTONIAN AND SLOVENIAN MANUFACTURING

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INTRODUCTION

Foreign direct investments (FDI) have had an important role in economic development of transition countries. Governments in Central and Eastern Europe (e.g. Hungary) also offer nowadays a lot of incentives for FDI. Justifications for that are traditionally the possible beneficial effects caused by transfer of technology from parent company to its local affiliate and related (positive) spillover effects to the host country in general that could also enhance the overall productivity and competitiveness of these countries.

Empirical literature, e.g. Aitken and Harrison on Venezuela in 1999, Djankov and Hoekman on the Czech Republic in 2000, Smarzynska on Lithuania in 2002, on the other hand shows, that there is little conclusive evidence to support this view. The aim of this paper is to study the effects of FDI on labour productivity in Estonia and Slovenia, in the sector of manufacturing. The reason for choosing these two small countries apart from the availability of data is the important differences in level of development between Slovenia and Estonia. Thus we can study the effect of FDI on labour productivity in two countries that have rather different stages of development, i.e. also the effects of FDI may be substantially different as well. In case one considers the investment development path theory by John Dunning, one can conclude that Slovenia is ahead, already in later stages of development than Estonia. Slovenia has the highest gross domestic product (GDP) per capita among the Central and Eastern European (CEE) countries and has had already for years substantial amount of outward direct investments itself (already long before transition period, even in 1950s). However, it is possible to monitor that in Estonia the FDI inflows (and inflow per capita) reach, until recent years, higher levels than in Slovenia. Outward direct investment is relatively recent phenomenon in Estonia, the GDP per capita is lower, (inward) FDI penetration rates are far higher, attitude and government policies, privatisation methods employed towards FDI more friendly and finally the reasons why investor choose this particular host country are different from Slovenia in Estonia.

The research is based on panel data from the 2nd part of 1990s to year 2001. The author studies the correlation between foreign equity participation in the firm and firm's own productivity, i.e. "own-firm" effect, if the terminology similar to the one of Aitken and Harrison (1999) is used. It is studied whether there exist intra – industry (i.e. within the same sector) spillovers from foreign affiliates to firms with no FDI and to other foreign affiliates. In addition to that we take a look at whether the "own -firm" productivity effects depend on the type of FDI. More specifically: what is the role of export/local market orientation in productivity effects of FDI – is there a difference in "own-firm" effect between export oriented and domestic market oriented FDI. The exporting/local market orientation dimension is usually with few exceptions (like Sgard 2001 or Harris, Robinson 2001), discarded so far in the analysis of FDI effects on productivity. Still, as this study indicates, the effects of FDI on host economy may be fairly different between those two named types of FDI. This issue of different host country effects of different types of FDI is also important for discussion on how should the governments design policies aimed at attracting FDI, is export oriented FDI better for the host economy as policy literature sometimes assumes? Literature concerning policies towards FDI, like *World Investment Report 2002 – Transnational Corporations and Export Competitiveness* (published by UNCTAD) often stresses the importance of attracting especially export-oriented FDI, assuming thus that type of FDI to be more beneficial for the host country. Our empirical findings also cast at least some doubt on this simple conclusion of policy literature, indicating also a need for continued future research of this question.

The author employs enterprise level panel data on manufacturing industries in Slovenia and Estonia in order to study the effects of FDI on productivity. The data stem from Statistical Office of Slovenia and Statistical Office of Estonia. Panel for Slovenia covers the yearly data of 982 enterprises in years 1994–2000. The panel for Estonia covers years 1996–2001 for 326 firms.

One issue that has been mentioned by several authors in relevant literature is the non-random selection of FDI recipients. In case most productive local firms receive FDI, unless the researcher tries to account for this matter, one might overestimate positive productivity related effects of FDI. To account for this possibility, in addition to the

usual methods of econometrics of panel data, the author also tries to employ a two-step sample selection correction procedure.

This study of horizontal spillover effects of FDI on productivity is embedded in a rapidly growing literature, it has the novelty of adding the export/local market orientation dimension to the analysis and the benefits of using large enterprise level panel data for two arguably quite different countries of Central and Eastern Europe.

The study consists of 3 parts, in the 1st chapter a discussion on the general issue of productivity is presented: definitions; measuring productivity; various types of productivity; importance of productivity for development; growth accounting. The author discussed the differences between productivity and efficiency, productivity and competitiveness; the Schumpeterian framework of analysis of productivity with emphasis on technological change and innovations. The second chapter provides an analysis of the theoretical framework of the effects of FDI on productivity and an overview of previous empirical literature in this field. The foreign direct investments and their productivity related "own-firm" and spillover effects are defined and studied, the starting point being the well-known OLI framework of John Dunning. As the emphasis of this thesis is on intra-industry, rather than inter-industry spillovers, the former have received more attention as well. The 3rd part of this study deals with the empirical analysis of the effects of FDI on productivity in Estonia and Slovenia. An overview of data is given, followed by a brief overview of FDI in Estonia and Slovenia. Then the general specification of the model is presented, results of econometric estimation for different panel-data model specifications are described and analysed, also the prospects and suggestions for future research in the field are discussed.

1. THEORETICAL FOUNDATIONS OF PRODUCTIVITY RESEARCH

1.1. Defining productivity

It is widely agreed that productivity and its growth form the basis for improvements in real income and welfare. Therefore measures of productivity levels and growth are vital economic indicators. As Paul Krugman has said: *Productivity isn't everything, but in the long run it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker* (Krugman 1990: 11). Productivity is closely related to notions such as economic growth and development, competitiveness, efficiency, technological change and innovation.

Table 1. Percentage of growth related to the number of years necessary to double the output

Productivity growth, %	Time to double economic output, years
0.5%	139
1.5%	47
2.5%	28
3.5%	20
4.5%	16

Source: authors' calculations.

As one can see from table 1, even one percentage point permanent increase in productivity growth - apparently a small difference, can make - when compounded over relatively long period of time – a big difference for nation's GDP level and standard of living. With the yearly productivity growth of only 0.5%, it would take an excessively long period of time - 139 years to double an economy's output. With 1.5% growth rate the time needed would be 92 years less, i.e. several generations shorter. The long-run growth rate of 4.5% would require only 16 years. The implications for society are self-evident. As well-known economist Lucas has commented (cited via Barro, Sala-I-Martin 1995): *If you start thinking about growth, it is hard to think of anything else.*

At its most elementary level, productivity is a measure of output per unit of input (Griliches 1988: 10; Gates, Stone 1997: 5; Mereste 1984: 20; Sharpe 2002: 31). This is a simple, rather technical and general definition, which can be employed in many different contexts. Productivity depends on both the quantity and quality and features of the products (which also determine the prices they command) and the efficiency with which they are produced (Porter 1998: 6). It describes the relationship (ratio) between output and the inputs that are required to generate that output (Schreyer, Pilat 2001: 128; Sharpe 2002: 31). Jorgenson defines productivity level as the ratio of real product to real factor input or the ratio of the price of input to the price of output (Jorgenson 1995a: 176-177).

Productivity, as a summary measure of performance also reflects whether the system under consideration is "wasteful" in some sense (Gates, Stone 1997: 5). The general definition does not indicate the right selection of indicators (ratio of indicators) for studying productivity. The choice between various different measures of productivity depends on the purpose of measurement and also, due to the restrictions of data collection and the real world, on the availability of data. Also nation's GDP per capita can be and is often used as a broad measure of productivity.

So far the general technical definition of productivity has been given. However, as Epstein (Männik 2002) and Gates and Stone (1997: 5) have argued, the study of productivity can also be organised in a more broader way, by analysing two different and complementary dimensions of the concept of productivity: namely the efficiency and the effectiveness. Efficiency analysis deals with comparing the outcome (output) with the resources used to achieve it. Or as Epstein (1992) has put it: efficiency refers to the level and quality of the service, which is obtained from the given amount of resources. If the subject (enterprise, sector etc) can produce bigger quantity and/or higher quality of output with the same amount of resources, it has improved its efficiency (Gates, Stone 1997: 5). According to some authors other than Epstein, there is still important distinction between productivity and efficiency. These two notions are very much related, but not identical concepts (Schreyer, Pilat 2001: 160). A firm or an industry is considered to be inefficient if it could produce more output with the existing inputs. This is the same as to say that the firm is not on its production possibility

frontier, but below it. Productivity by definition is a concept relating the quantity of output of production to one or more inputs used in its production, irrespective of the efficiency of use of these inputs (*Ibid*. 2001: 160).

Effectiveness as the second possible dimension of productivity is related to the aspect of achieving the goals- e.g. effectiveness relates to the extent to which the provider meets the demands of shareholders or consumers (Männik 2002; Gates, Stone 1997: 5). Thus effectiveness is a more subjective criterion than technical efficiency, also the measurement and comparison of effectiveness is more troublesome. This has lead to the overwhelming use of notion productivity in its narrower (and more technical) meaning, e.g. by Dale Jorgenson in his books Productivity I – II (Jorgenson 1995a: 176-177; Jorgenson 1995b: 17-22). In this paper, the author will employ the usual efficiency related understanding of productivity. Still it is important to bear in mind the broader definition, as it makes clear that productivity improvement is a multi-faced concept that is not synonymous with "cutting costs." The issue of goals of the particular institution or system should not be forgotten in the analysis.

We have already mentioned the importance of productivity for economic growth and development, it can be seen as the main factor of growth and competitiveness. Its importance is also shown by following argumentation (adopted from P. Krugman "The Age of Diminishing Expectations"). We ask the following simple question: How could we raise consumption per capita? As a matter of simple arithmetic, there are only some ways to do it:

1. We could increase productivity so that each worker produces more.
1. We could put a larger portion of the population to work.
2. We (in case we are interested only in short-run gains) could put a smaller faction of our output aside as investment for the future and devote more of our productive capacity to manufacturing goods for current consumption.
3. We can import more without selling more abroad – which means that we have to borrow or sell assets to pay for the extra imports.

5. We can get a better price for our exports so that we can afford to import more without borrowing. (Krugman 1990: 12-13)

Or we can just make our goods better, which is just a productivity increase under another name (Krugman 1990: 12-13). This shows the importance of productivity for us, we can increase production by increasing inputs (capital, labour etc) or we can convert the inputs into outputs in a more efficient way. As the amount of inputs is restricted, the extensive growth is not possible forever. What can be increased, is the efficiency of turning inputs into outputs. Following that, one conclusion is that there is no potential (maximum possible) level of productivity (Männik 2002).

1.2. Measuring productivity

For calculating productivity, i.e. ratio of output to input, one can use any inputs that are used in production process as the denominator. Thus the productivity of labour, capital or any of their sub-categories or that of the combinations of inputs can be discussed. The output can be given in physical units (kg, meters etc) as well as in monetary units (gross output, net sales, value added). The input of production process can be studied in natural units (as number of people) and in time units (working hours etc). (OECD Productivity Manual 2001: 21-38)

Broadly, productivity measures can be classified as:

1) single–factor productivity measures (relating a measure of output to a single measure of input);
2) multi–factor productivity measures (relating a measure of output to a bundle of inputs). (Schreyer, Pilat 2001: 129)

A special case of multi factor productivity is a measure relating output to all inputs used in the production process (*Ibid.*: 129) – total factor productivity (TFP), or according to Jorgenson - ratio of certain index numbers of total output and total input (Jorgenson 1995a: 57). Another useful distinction (for firm or industry level analysis) is between productivity measures that relate gross output to one or several inputs and those that use a value-added concept to capture movements of output (Schreyer, Pilat 2001: 128). It is also important to mention that actually the inputs of production are not capital and labour themselves, but their services to production, which are approximated in the case of labour by the amount of working hours or the number of working people and in case of capital by the amount of capital assets.

Table 2. The main types of productivity

	Type of input measure			
Type of output measure:	Labour	Capital	Capital and labour	Capital, labour and intermediate inputs (energy, materials, services)
Gross output	Labour productivity	Capital productivity	Capital-labour MFP	MFP (also called KLEMS MFP)
Value added				
	Single factor productivity measures		Multi-factor productivity measures (MFP)	

Source: Schreyer, Pilat 2001: 129.

The most commonly used input in productivity analysis is obviously the labour. One important reason for that is that it is relatively easy to measure the labour as an input of production if compared to measuring other inputs. The productivity of land has been quite important in history, but nowadays after industrialisation, it is not considered as important for economic growth as the productivity of other inputs.

One can also speak about the productivity of capital. The availability of statistical data for this indicator is poorer than that for labour productivity. In addition, there exist theoretical difficulties of measuring capital: what is capital (what should be included/excluded), how to determine the depreciation rate etc. (Jorgenson 1995a)

In productivity analysis a particular problem with inputs is that they are not homogenous, the features/quality of inputs can vary to a large extent and be the reason of productivity differences between industries, firms etc. However by analysing the productivity as a ratio of measure of output to input the researchers often fail to take the quality changes into account (often due to difficulties with measuring the quality and its improvement). If variety (i.e. complexity) of labour is not taken into account, we loose some valuable information, although we may still obtain useful measures of productivity (useful also for their simplicity). There is a kind of trade-off between keeping the input measure as simple as possible (i.e. abstaining from the variety of the real case) and including more information about inputs in the analysis (making the estimation and inference on productivity thus more blurred). It is possible to can witness similar situation also in other matters in economics. The case of the representative agent is the best example (see e.g. Romer 2001) - for the sake of simplicity we use the assumption of representative agent in economic models. We

sacrifice detailed information on the effects of variety to get a (quicker) overall view of the essence.

The economic theory of productivity and its measurement is to a large extent based on the use of production function and the neoclassical equilibrium concept (e.g. see Schreyer, Pilat 2001: 162; Jorgenson 1995a: 8, 53). The use of the production function in theory of productivity measurement goes far back to the works of Jan Tinbergen (1942) and Robert Solow (1957). Robert Solow used the approach of growth accounting to identify the contributions of different inputs to output growth. The short outline of this approach is given here (Schreyer, Pilat 2001: 130-134; Jorgenson 1995a: 144-167; Gust, Marquez 2001: 56; Romer 2001: 28-30). We have a production function:

(1) $Y = F(A, K, L, M)$;

where output (Y) is produced using labour (L), capital (K) and intermediate inputs (materials – M) as inputs. A is a parameter of technological state. Though there is no consensus on the exact specification of this function, the Cobb-Douglas production function is often used (e.g. Gust, Marquez 2001: 56).

We use a simpler form (without materials as input), where output Q is measured as deflated value-added and inputs are confined to primary inputs of labour L and capital services K for giving the growth accounting equation

(2) $Q = H(A, K, L)$.

Differentiating this expression with respect to time and using logarithmic rate of change yields us:

(3) $$\frac{d \ln Q}{dt} = s_L \frac{d \ln L}{dt} + s_K \frac{d \ln K}{dt} + \frac{d \ln A}{dt};$$

where s_L and s_K denote the revenue share of each factor.

In this expression, labour and capital each contribute to value added growth and their contribution is measured as the rate of change of each input times its share in the total revenue. The change in the value added, that is not explained by these contributions, is

attributed to multifactor (or total-factor) productivity growth, captured by the variable A. The rate of change of A (multi-factor productivity growth) is measured residually (often named as the Solow residual):

$$(4)\ \frac{d\ln A}{dt} = \frac{d\ln Q}{dt} - s_L \frac{d\ln L}{dt} - s_K \frac{d\ln K}{dt};$$

i.e. by subtracting the contributions of labour and capital from the rate of output growth. MFP growth is positive when the rate of growth of the volume of output rises faster than the rate of growth of all combined inputs.

Another useful way of presenting the growth accounting equation is in terms of decomposition of the rate of change of labour productivity. Labour productivity growth is given as the difference between the rate of change of output growth and the rate of change of labour input growth:

$$(5)\ \frac{d\ln Q}{dt} - \frac{d\ln L}{dt}.$$

In order to find the decomposition of the movement in labour productivity the expression number 4 is re-arranged. Using the approach of Solow, the growth of labour productivity (see following expression 6) can be divided in two components (Schreyer, Pilat 2001: 131). The first part on the right hand side of equation depicts the change in labour productivity due to capital deepening (labour productivity rises when more capital is used per worker). The second part shows the effects of MFP growth (it encompasses technological change and the effects of other inputs not used in analysis that promote the growth of output):

$$(6)\ \frac{d\ln Q}{dt} - \frac{d\ln L}{dt} = (1 - s_L)\left(\frac{d\ln K}{dt} - \frac{d\ln L}{dt}\right) + \frac{d\ln A}{dt}.$$

One simple remark - that ought to be given here, is the one of distinction between MFP and TFP, often in literature the efficiency measure of capital and labour combined is given as TFP, still TFP means that combination of all inputs is used in the denominator of the measure, thus MFP might be a better name to be used here.

From the last expression above the two components of labour productivity growth were found: the capital deepening and the Solow residual. However, in addition to these two, there exists also the third important component not given in the last equation: the growth of the quality of labour that can be an important contributor to the labour productivity growth as well. (Schreyer, Pilat 2001: 131)

From the above analysis we have seen, that inputs of production process can be capital, labour, materials as intermediate inputs, land. In addition, the human capital accumulation is vastly important for growth (Aghion, Howitt 1997; Aghion, Howitt 1992; Blomström, Kokko 2003). Endogenous growth literature stresses the importance of knowledge creation activities, analyses technological progress as endogenous of the model and contrasts with the neoclassical theory of growth, which focuses attention to capital accumulation (Ruiz 2003: 10).

Measures of productivity address the issue of how much output is on average produced by different factors of production. The most commonly used measure of productivity is the labour productivity, whereas most commonly used proxy of labour productivity is value added per working hour (Gust, Marquez 2001: 55; OECD Productivity Manual 2001: 13; Sharpe 2002: 33). This measure has important advantages of easy measurement (OECD Productivity Manual 2001: 13) and interpretation - i.e. how much output is produced on average, by each unit of labour employed in production (Gust, Marquez 2001: 56). Also net sales and gross output (i.e. net sales plus/minus the change in inventories) are often used as the output measure, the numbers of the employed is more often than the hours used as the input measure. According to OECD *Productivity Manual*, the hours worked is the most preferred measure for the quantity of labour input by a person (OECD Productivity Manual: 105). Authors like Schreyer and Pilat emphasise that: “Labour input is most appropriately measured as the quality adjusted number of hours actually worked (Schreyer, Pilat 2001: 138). Also Christopher Gust and Jaime Marquez stress (2001: 57), that accounting for the changes in the hours worked, as opposed to merely accounting for the changes in the number of employees, is important. Hours per worker may change over time relative to some trend and thus provide firms with a margin with which to vary labour input. Empirically, the 1980s and 1990s saw a decline in the number of hours worked per employee in several

(Western) countries. This means, that abstracting from the role of hours worked would overstate the amount of growth of labour input and understate labour productivity growth (*Ibid.*: 57).

Unfortunately hours worked by industry are often difficult to obtain, especially for individual industries. In many countries, information on average hours per employed persons exists only for major aggregates or the entire economy. Even where industry-level data are available, it has to be taken into account, that their international comparability is hampered by differences in countries' methodologies to derive average hours per person. There are also some limitations and drawbacks of this measure of productivity as labour productivity is a partial productivity measure and reflects the joint influence of a host of factors. It is easily mis-interpreted as technical change or as the productivity of the individuals in the labour force. (OECD Productivity Manual: 105)

The number of the employed constitutes a less preferable measure of labour input because it reflects neither the shifts in the composition of part- and full-time work nor the changes in the average number of the hours worked by full-time employees (OECD Productivity Manual 2001: 105). In addition, this measure also fails to reflect multiple job holding, self-employment and quality of labour (Schreyer, Pilat 2001: 138; Jorgenson 1995a). However this measure, unlike the hours worked is usually available to the researcher and the international comparability of this input measure is likely to be better than that of the hours worked (OECD Productivity manual 2001: 105). Thus the use of productivity indicator, the choice of input and output measures, depends on the aims of research and on the data availability. One conclusion would be that, if available, hours actually worked would serve better as a measure of labour input, since it bears closer relation to the amount of productive services by employees than would the simple head counts.

For measuring capital input, capital services are the preferred measure. Still, usually time series statistics of capital services do not exist independently from productivity measurement. A step-by-step guide for constructing time series for such measure can be found e.g. in OECD *Productivity Manual* (Chapter 5). Measures of gross and net stocks of capital clearly constitute an inferior measure of capital input compared to the capital

services series. Both of these measures have been extensively used in productivity analysis, however one shortcoming here would be the likelihood that these two could give the researcher a biased measure of the contribution of the capital to the growth. Empirically it has been found (*Ibid.*: 105), that the indices of the gross and the net capital stocks tend to rise less rapidly than the measures of capital services. The implication is a tendency to understate the contribution of the capital to the output growth and to overstate the residual MFP index (Schreyer, Pilat 2001: 142).

As the aim of this thesis is to study the effects of FDI on productivity in manufacturing, the author will not discuss here the difficulties of measuring productivity in the services sector. We also only mention here the issue of differentiating labour input by different types of labour quality, as it would require substantive investment in data and methodology, which is beyond the scope of this study.

From transition countries Estonia is chosen here as an example on which productivity measures are available for the manufacturing industry. For Estonia, the following measures of productivity in the manufacturing sector are published by the Statistical Office of Estonia in their bulletin *Industry* (Tööstus 2002: 40-41):

- Labour productivity (output per employee) = production / average number of employees in a year;
- Hour productivity of labour (output per working hour) = production / number of working hours;
- Productivity of labour costs (output per labour costs) = production / labour costs;
- Unit-labour cost = labour costs / production.

The measure of output, production is calculated as sales plus change in the inventories of finished/unfinished goods. Labour costs means wages and social tax payments.

1.3. Productivity in the Schumpeterian approach

There is an abundance of important notions/phenomena in economics that are to a greater or lesser degree related to the productivity or affect it. Here below the author presents a discussion of some of the probably most important of these: the innovation, the technological change and the competitiveness.

In achieving higher efficiency and productivity, the innovations and/or technological changes play a major role. In fact, it is rather difficult to overestimate the role of innovations in the long-term growth of productivity and of GDP. The concept of innovation has played a prominent role in economics and is seen as an important contributor to the productivity growth. It is due to Austrian economist Joseph Schumpeter (1883 – 1950) that innovation (and creative destruction) was identified as the essential function of the entrepreneur and the fundamental force behind economic growth and development (thus also behind productivity growth, Ruttan 1959: 334). During the last decades there has been a revival of interest in the works of J. Schumpeter (Fagerberg 2002: 1). His theory is presented in his books "Capitalism, Socialism and Democracy" (1942) and "Business Cycles" (1939). His theory applies to a lot of structural aspects of growth and his contributions to economic growth are still being studied and discussed. Schumpeter's idea of creative destruction was (1942: 83; cited via Aghion, Howitt 1992: 324 and Magnusson 1994: 141):

The fundamental impulse, that sets and keeps the capitalist engine in motion comes from the new consumer's goods, the new methods of production or transportation, the new markets,…[This process] *incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating new one. This process of Creative Destruction is the essential fact about capitalism.*

Schumpeter stated that economic processes are organic and that the change comes from within the system and not simply as an exogenous factor. The change comes through innovations; hence, innovations and technology are endogenous to the system (Ruiz 2003: 2). Several models of economic growth have been developed based on Schumpeter's process of creative destruction, especially important is the one of Aghion and Howitt in their famous article from 1992 where they proposed the endogenous

growth model (Aghion, Howitt 1992; Ruiz 2003: 7). One conclusion that is important also for the productivity analysis, is that growth results from the technological progress, which in turn results from technological competition among firms that generate innovations. Firms are motivated to innovate by higher payoffs, by the prospect of monopoly rents that can be captured by successful innovator firms (Ruttan 1959: 334). Those rents (in form of higher profits etc) however are temporary and will in turn be destroyed by the next innovations of other firms (that make the former innovation obsolete, Aghion, Howitt 1992: 349).

We have employed the notion "innovation" so far without one clear definition. This short-coming shall be corrected here, using the contemporary view in endogenous growth theory, introduced however long before endogenous growth theory by J. Schumpeter. Innovation is not the same as invention – innovation is possible without anything we should identify as invention, and invention does not necessarily induce innovation but produces of itself no economically relevant effect at all. The innovator is the one who provides the decisive impulse for the transformation of the economic environment. (März 1991: 25)

One can define innovation by means of production function - as a change in production function (Ruttan 1959: 334; see also März 1991: 8 - 15). Production function describes the way in which quantity of products varies if quantity of inputs varies. If, instead of quantities of factors, the form of the function is varied, we have an innovation (Schumpeter, "Business Cycles" 1939; cited via Ruttan 1959: 334).

Or again citing Schumpeter from his "Business Cycles":

... we will simply define innovation as the setting up of a new production function. This covers the case of a new commodity as well as those of a new form of organization or a merger, or the opening up of new markets ... (Schumpeter: 1939; vited via Ruttan 1959: 334).

The reader should be reminded here, that the notion of production function by Schumpeter is somewhat different from the usual neoclassical notion (Schumpeter did not include capital as input). However we can see striking resemblance between this

given definition of innovation and the usual definition of technological change (by Solow, or any neoclassical theorist)[1]

The more usual definition of innovation than the change in production function can be found e.g. from publication "Innovation in Estonian Enterprises 1998-2000". There, firstly a broader and secondly a more restrictive definition is employed. Innovation in broader sense is the adoption of the new ways of acting by certain social communities, which are suppliers, involved organisations and subunits, groups and persons. More restrictive definition is that of the technological innovation, which involves the product and process development and limited list of organisational innovation activities like marketing and training directly related to the implementation of new product, service or process. (Kurik *et al*. 2002: 22)

From the theoretical ideas of Schumpeter one can, in addition to the importance of innovations and technological competitiveness for productivity growth, also conclude, that the age of firm might play some role as well. Schumpeter's idea was, that new firms are the innovator firms. He has written in his *Business Cycles* (1939) that: *Even in the world of giant firms, new ones rise and others fall into the background. Innovations still emerge primarily with the "young" ones, and the "old" ones display as a rule symptoms of what us euphemistically called conservatism.* (Fagerberg 2002: 15)

This idea is quite plausible, as in older firms there are probably more institutional and/or behavioural rigidities (due to the track record of the firm and existence/ownership of technologies or strategies that have worked before, are may be not most up to date, but still work). In a starting enterprise, on the other hand, many things have to be done afresh. Also there might be differences in soft values like extent of freedom of speech, tolerance and attitude to "wrong" ideas (ranging from positive good humour to deep hostility) between old firms and new ones. These soft values may have significant effects on productivity and competitiveness of a firm. Or the arguments of Kasper and Streit that can be used here, that informal internal meta rules are important: such as e.g. tolerance of experimentation; the rule that conflicts can be eased by a sense of humour; and a commitment to free speech (Kasper, Streit 1998: 394).

[1] Citing Robert M. Solow (1957): *I am using the phrase "technical change" as a shorthand expression for any kind of a shift in the production function* (Ruttan 1959: 334).

They also stress the importance of freedom. Freedom helps individuals realise their aspirations with best results (*Ibid.*: 394). We can guess that old firms are probably more prone to use punishment attitude towards "outrageous" new ideas, thus hampering possible innovations as well. New firms first need to build their competitive advantage, they have to break the routine not preserve the achieved.

In literature the idea that new firms are major innovators is often somehow mistaken for the idea that bigger firms are more prone to innovate (also by mistake called often the "Schumpeter's hypothesis", Fagerberg 2002: 16). Schumpeter did not argue that bigger firms innovate more (however this may be true due to the economies of scale), but emphasised the role of newcomers. This view has important implications for those studying productivity. Usually the researchers of growth and productivity give major attention to the production function, which describes the average performance of the economy or the industry (Ruttan 1959: 335). According to this idea it may be valuable to study (the changes in) the production functions of the technological leaders – the innovating firms. Additional characteristic features of innovations that are often discussed in literature are the appearing of innovations in cycles and the clustering of innovations (i.e. time and regional clustering). We will not engage in more thorough analysis of the clustering of innovations, the reader is advised, if interested, to consult e.g. a book by Lars Magnusson *Evolutionary and Neo-Scumpeterian Approaches to Economics* (1994) or original books of Schumpeter like *Business Cycles* (1939) for further reference.

Innovations matter a lot to productivity growth; one interesting issue that concerns innovations and productivity growth is who gets the benefits of innovations. Is it the one that spends on innovation or are there spillover effects to others, e.g. to other companies?

Figure 1 illustrates the so-called "innovation tree" and the effect of innovations on productivity. The abbreviation "Inn" denotes the innovations, if Inn=1 there occur innovations (and productivity growth), if Inn=0 there is no innovation (and no productivity growth). The firm has initially a choice between: 1) to try to innovate ("Try, invests" in figure 1) and 2) not to try to innovate ("Not try" in figure 1). "Trying" in this framework here in figure 1 also means investing into innovative activities

(regardless of the type). For choice number 2 the productivity growth is 0, as no innovation occurs. If a firms tries to innovate, it faces possibilities to either fail or to succeed. "Success" obviously means here some sort of innovation and hence probably also growth in productivity. Failure ("Fail" in figure 1) in this framework of Criscuolo and Hasker (2003:13–14) means no innovation and the effect of failure on productivity is assumed to be the same as in the case of not trying at all.

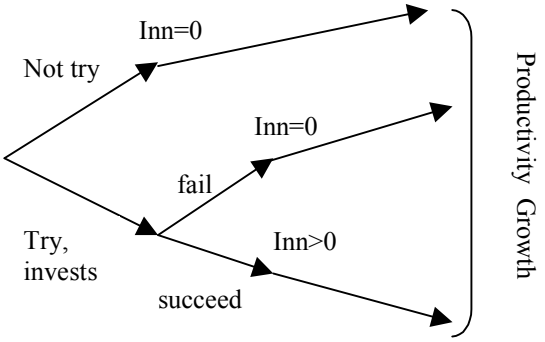

Figure 1. Innovation tree, innovative activity and productivity growth (Criscuolo, Hasker 2003: 13).

Obviously we have engaged in analysis of a relatively short-term span. It would be possible to argue - that unlike in this graph, at least in the long run the effects of trying and (initially) failing can have vastly different productivity consequences than not trying at all. Initial failure can probably have learning effects and can that way contribute to the know-how of the enterprise and help later innovations, hence may indeed have positive effect on productivity.

This second "innovation tree" on figure number 2 depicts the situation where innovation "spillovers" may occur. The firm has a choice to either "try" to innovate ("try" does not mean any more investing itself in innovation, but also encompasses the use of knowledge from other firms) or not ("not try" in figure 1 and 2). If it indeed tries, then it can make use of knowledge spillovers from the other innovators without spending itself on innovation ("No spend" in figure 2) or it can spend itself on innovations. It is

obvious that an enterprise that spends on innovations has some positive result as a consequence, i.e. innovation takes place and the productivity grows as well (Fagerberg 2002; Ruiz 2003). An interesting idea is however that companies spending on innovation might not reap all the benefits associated with it, i.e. also firms that do not spend on R&D can receive positive spillovers through channels like e.g. imitation effects, worker mobility between firms. The existence of innovation spillover effects has similarities with spillover effects of FDI (that will be discussed in detail in chapter 2, see also e.g. Aitken, Harrison 1999).

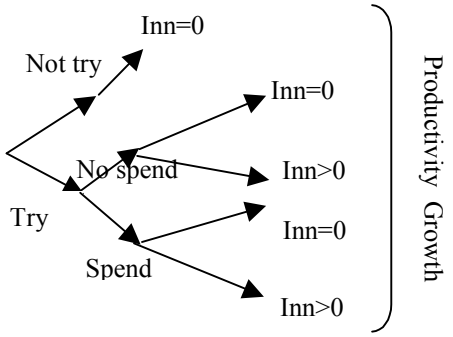

Figure 2. Innovation tree II, spending on innovation and productivity growth (Criscuolo, Hasker 2003: 14).

Most approaches to measuring productivity are very firmly connected to the neo-classical equilibrium concept (Jorgenson 1995a: 53). As Paul Schreyer and Dirk Pilat have argued, the equilibrium conditions are very important because they help to guide measurement of parameters that would otherwise be difficult to identify (Schreyer, Pilat 2001: 162). Still the equilibrium approach fits somewhat uneasily with the notion of innovation and productivity growth. Evolutionary economists as e.g. Dosi, Nelson and Winter (Schreyer, Pilat 2001: 162; Fagerberg 2002) argue that innovation and technical change occur as a consequence of information asymmetries and market imperfections. In a quite fundamental way the innovations and the information asymmetries constitute one and the same phenomenon. Such asymmetries can scarcely be labelled as market imperfections when they are the necessary conditions for any technical change to occur

in the market economy. The main idea by evolutionary economists is that the equilibrium concepts may be not the right tool to approach the measurement of the productivity change, because if there was an equilibrium, there would not be any incentive to search, research and innovate, thus there would also be no productivity growth (Schreyer, Pilat 2001: 162). Evolutionary economists underline the significance of discontinuous and qualitative changes, the role of restricted knowledge, information and fundamental uncertainty, increasing returns, external effects and decision making (Magnusson 1994: 268).

Certainly this kind of criticism has its points, but it does not invalidate the usefulness of the standard equilibrium approach to productivity measurement. It is just stated that it has its limits; the growth accounting method has to be complemented by the institutional, historical and case study evidence to investigate all perspectives of productivity and its change. (Schreyer, Pilat 2001: 163)

The notion *productivity* has similarities with and is closely related to the often-used notion *competitiveness*. Paul Krugman has even argued, that the word "competitiveness" is a metaphor - a poetical word for productivity (Krugman 1996: 18). Productivity certainly has important implications on competitiveness of a nation, a sector or a firm and it ought to be studied as the central part in the analysis of competitiveness. Sometimes unfortunately, the analysis of productivity is discarded in the analysis of competitiveness and only the exporting dimension of competitiveness is studied. E.g. by definition of Dluhosch, the competitiveness of an economy means the ability of local enterprises to sell their goods and services on the international market (Dluhosch *et al.* 1996). We could however, call this an ability to export. Competitiveness on enterprise level means study of costs and revenues – i.e. profit (McFertridge 1995). This means that the researcher should also study productivity of an enterprise, if he want to study its competitiveness. Also Michael Porter reaches this conclusion in his book *The Competitive Advantage of Nations* (Porter 1998). At the beginning of this chapter a well-known citation by Paul Krugman, indicating the vast importance of productivity was given, the reasoning for it has been provided here. With the conclusion that productivity matters and what especially matters for raising productivity, is the creation of knowledge, we sum up the first chapter and continue

with the theoretical framework of the effects of foreign direct investments on productivity in the following chapters.

2. THE EFFECTS OF FDI ON PRODUCTIVITY

2.1. Background and definitions

It is widely agreed upon, that among the most important inputs for economic growth in any country are human capital (e.g. skilled labour), physical capital and technological development (Aghion, Howitt 1997). The lack or backwardness in some of these factors can become a great impediment to growth, although based on historical evidence, one could argue, that for example lack in physical capital can be to some extent overcome/balanced by relative abundance in skilled labour and technological know-how. An example for such situation could be the rapid economic development of West-Germany in the 1950s. During World War II the physical capital in form of production facilities was to a large extent destroyed, but human capital in form of skills of the people and technological know-how remained intact and could be used to accompany investments into physical capital, magnifying their effect and thus helping achieve extraordinarily high growth rates for that time.

The transition countries in the Central an Eastern Europe have been facing similar problems as e.g. Germany in the past. Both the past and also theories of growth (see e.g. Aghion, Howitt 1992) show the policy makers in transition countries the importance of human capital in development. The use of physical capital and new technologies would be limited without existing absorptive capacity of local firms and in case the gap in skill levels with source countries of FDI is too large in the economy (Damijan *et al*. 2003; Blomström, Kokko 2003: 4; Chudnovsky *et al*. 2003: 12-13; Kinoshita: 2000: 2). The experience strongly supports the idea that for transition countries, which at the beginning of transition lacked both capital and technological know-how, the FDI could be vital source for capital and technological and managerial know-how. This can go through both the entry of foreign companies into the market or FDI to the existing firms and spillovers from these foreign investment enterprises (FIE) to local capital based

domestic enterprises (DE). Thus FDI is convenient tool for solving many transition problems that these countries face.

As FDI means direct inflow of on one hand capital and on the other know-how, one could expect the FIEs to perform on average better than the DEs (Oulton: 122-123). In addition, there may exist also spillover effects form FIEs to DEs, in form of transfer of technology and know-how and also competition effects (Aitken, Harrison 1999: 605), the different types of spillovers will be analysed further in this chapter.

Spillover effects can occur due to the fact that multinational enterprises (MNEs) cannot internalize the full value of the benefits associated with their presence in the host country, some of it "spills over" to the local firms (Blomström, Kokko 1996: 7). These (possibly) beneficial effects have been only part of the reasons for creating convenient environments for potential foreign investors in CEE countries. However, this argumentation encourages governments all over the globe (not only transition economies) to promote inward foreign direct investments by providing incentives for FDI (not only by developing good business environment) in order to encourage thus technology spillovers from foreign owned to domestic owned enterprises (Smarzynska 2002: 1). If indeed there are positive (and large enough) spillovers, some type of incentives for FDI might be justified[2] from the governments. This framework, regardless whether true or false - has been the usual reasoning that governments often adopt while designing their FDI policies. There is a proliferation of investment incentives across the world. As Ari Kokko has argued in *The Development Dimensions of FDI: Policy and Rule-making Perspectives* (2003: 31-38), more than 100 countries across the globe provided various FDI incentives already in the mid-1990s and many more have introduced such incentives since then – i.e. quite few countries compete for foreign direct investments without using subsidies today. One of them is Estonia, which

[2] Even then we can argue against incentives as following: the issue about spillovers is about externalities and in case of positive ones - about "doing good" (either voluntarily or involuntarily), it is highly questionable whether the government should intervene by subsidies any time someone (firm etc) does "good" to others. The author thanks Karsten Staehr (visiting lecturer at the University of Tartu) for this point.

has been very successful in attracting foreign investors without the use of some special incentives for targeted industries[3].

The assumption of positive effects of FDI on the host country have often led to quite extensive incentive providing systems in practice in a number of countries in the world (see e.g. Ari Kokko 2003: 30). One could sometimes term this competition for FDI even as incentive race between countries, more influential MNEs often engage in seeking the best location for their production/projects by creating auction-type bidding by governments. The location is established there, where the host country is most generous in providing subsidies. For this type of behaviour of MNEs, the notion, known from institutional economics - "rent seeking", is probably better for use than "profit seeking behaviour". One good example of such incentive race from recent years is the case of Intel in deciding between Mexico and Costa Rica as competing locations for FDI. Intel Corporation went in several rounds from one government to the other, showed the offers that the competitor gave and asked for better deal, thus maximising the payoff of Intel. Rational behaviour for Intel, but is it also rational and optimal behaviour for the government (in this particular case the winner of the bidding rounds was Costa Rica)? (Larrain *et al.* 2003: 3)

The questions we returned to by now are: to what extent is FDI beneficial for the host country, is it always beneficial and thus justifies subsidies to foreign companies? Do the benefits depend on some certain characteristics of FIE and the characteristics of the host country and what could be these characteristics? Thus, should FIEs be treated equally with local firms or not?

We address these issues, with emphasis on the effects of FDI, here in this chapter more thoroughly. So far given (various) definitions of productivity have been given. As it is the influence of FDI on productivity that this research deals with, *FDI* and *direct investment enterprise* ought to be defined as well. The most usual and uniformly acknowledged definitions of these two can be found in IMF Balance of Payments Manual or in a publication of IMF *Measuring Foreign Direct Investment* (also

[3] Estonian Investment Agency, as a part of Enterprise Estonia engages in FDI targeting mainly into three industries: machine building (subcontracting for automotive industry), electronics (esp. ICT) and services (call-centres etc). Source: EIA, Enterprise Estonia

published in basically the same way in various other publications of IMF, OECD, World Bank and WTO).

Direct [foreign] *investment is a category of international investment made by resident entity in one economy (direct investor) with the objective of establishing a lasting interest in an enterprise resident in an economy other than that of the investor (direct investment enterprise). "Lasting interest" implies the existence of a long term-relationship between the direct investor and the enterprise and a significant degree of influence by the direct investor on the management of the direct investment enterprise.* [note: This shows also the main difference of FDI from portfolio investment.] *Direct investment involves both the initial transaction between the two entities and all subsequent capital transactions between them and among affiliated enterprises, both incorporated and unincorporated.* (IMF, Measuring… 2001: 23)

Direct investment enterprise: is an incorporated enterprise in which foreign investor owns 10 percent or more of the ordinary shares or voting power for an incorporated enterprise or an unincorporated enterprise in which a foreign investor has equivalent ownership. Ownership of 10 percent of the ordinary shares or voting stock is the guideline for determining the existence of a direct investment relationship. An "effective voice in the management", as evidenced by an ownership of at least 10 percent, implies that the direct investor is able to influence, or participate in, the management of an enterprise; absolute control by the foreign investor is not required. One has to mention however that not for all countries and for all types of data the treshold level 10% data can be found. Sometimes the 50% level is used (for Estonia also the 20% level was used some years ago) instead of 10%. (*Ibid*.: 23)

Direct investment enterprises are defined as those entities that are either directly or indirectly owned by the direct investor and comprise:

- subsidiaries (an enterprise in which a non-resident investor owns more than 50 percent);
- associates (an enterprise in which a non-resident investor owns between 10 and 50 percent) and;

- branches (unincorporated enterprises wholly or jointly owned by a non-resident investor). (IMF Balance… 1995: 86-88)

When the 10 percent ownership requirement for establishing a direct investment link with an enterprise is met, certain other enterprises that are related to the first enterprise are also regarded as direct investment enterprises. Hence the definition of direct investment enterprise extends to the branches and subsidiaries of the direct investor (so-called "indirectly owned direct investment enterprises". For more information about defining and measuring FDI, the reader is advised to consult these two primary sources: OECD Benchmark Definition of Foreign Investment (1996) and the IMF Balance of Payments Manual (1995) or IMF Balance of Payments Compilation Guide (1995). They describe in detail the scope of enterprises that should be included in the definition.

2.2. FDI and productivity - the framework of analysis

It is useful to establish the general framework of the analysis of the productivity related effects of FDI on the well-known OLI paradigm (also called eclectic paradigm, Dunning 1988: 2) of FDI by John Dunning (and on production function analysis in empirical estimation). The starting point here is the question why firms undertake investment abroad to produce the same goods as they produce at home (Blomström, Kokko 1996: 2). In the well-known OLI framework of John Dunning, enterprise's decision to invest abroad is determined by the so-called OLI advantages.

O- ownership advantages (firm specific knowledge based assets: patents, trade secrets, trademarks, human capital, management and reputation for quality);

L – location advantages (factors of production, their quality, abundance and costs, taxes, market size etc);

I – internalization advantages (it must be beneficial to transfer knowledge internally to MNE's affiliate rather than use market transactions as e.g. licensing). (Dunning 1998: 2)

The OLI paradigm identifies advantages and conditions under which FDI occurs. It must be beneficial for the firm possessing O-type advantages to exploit them internally (I) rather than exchange them on the market through licensing or co-operation

agreements with an independent foreign firm. These incentives depend, for example, on the specific characteristics of the knowledge to be transferred and the costs of transferring it. It must be beneficial to utilize those advantages in a foreign rather than in a domestic location. (*Ibid.*: 2)

A foreign firm in a foreign production location has several information disadvantages – in form of local market or factors of production related knowledge, no established local networks, relationships with authorities etc - if compared to domestic firms of the host country. Thus FDI, in order to take place, has to have some advantage that would compensate for local information disadvantages if compared to DEs. There has to exist some kind of ownership advantage (technological or managerial know-how, patents, licences etc) that will compensate and in interaction with advantages of host country as location of production (location advantages) and internalization advantages (i.e. if it pays more to substitute market transactions with the ones inside the firm) surpass the achievements/efficiency/productivity of indigenous enterprises. Theory of FDI stresses the positive links between firm-specific knowledge based assets and the decision to invest abroad (e.g. Dunning: 1988: 1-5; Blomström, Kokko 1996: 2; Harris, Robinson 2001: 3; Jaklič, Svetličič 2003: 4).

If there occurs FDI, then these technologies, ideas, skills, working practices and information that make up the ownership advantage of MNEs are transferred across national borders (at least to some extent). Alternative way of international technology transfer to host economy would be via licensing agreements or participation in international trade, by importing new products or capital goods or learning about technologies by exporting to foreign buyers (Varblane *et al*. 2001).

Among other channels of technology transfer, FDI are considered to be the major one (Blomström, Kokko 1996: 4; Damijan *et al.* 2003: 4). This technology transfer by FDI could have compositional (own-firm or own-plant) and behavioural (spillover) effects on host economies:

1) own-firm effect - average performance characteristics of foreign enterprises differ from those of domestic firms in the host country (are presumably better than these of DEs);

2) various spillover effects from the presence of foreign firms affect the performance of domestic firms (and other foreign affiliates active in host country – are also usually presumed to be positive). (Aitken, Harrison 1999: 605-608; Blomström, Kokko 1996: 7, Smarzynska 2002: 1-5)

Some main aspects of technology transfer to MNEs own affiliate in host country have already been discussed in this research paper. The extent of transfer of technology to local affiliate depends on the reasons why FDI was made into the country (i.e. host country advantages), what role and probably also what extent of autonomy does the local FIE have in MNE's value added channel. If the main reasons for investment were the low cost level of host economy and cheap labour or other factors or production, then it is less likely that higher value-adding activities would be transferred to local FIE. Thus the "own-firm" or "own-plant" effect of FDI depends on the international competitive advantage of the host country and reasons why FDI was undertaken by this particular MNE. Higher value creating activities (e.g. R&D) are more likely to be allocated to local FIE in case there exists some certain level of absorptive capacity in the local firm and/or host economy as a whole (Damijan *et al*. 2003: 18).

The advantages of FDI that presumably result in higher average characteristics (incl. productivity) of FDI affiliates than domestic enterprises are well documented in literature, but as Harris and Robinson (2001: 1) argue, depend fundamentally on the assumption that productive efficiency is higher in foreign-owned companies. Dunning has (1998, 2000) provided an extensive overview of the relevance of his OLI (also called eclectic) paradigm based on advantages of ownership, location and internalisation. In addition to that, the "classic" paper in the field by Aitken and Harrison (1999) summarises the most important reasons why economists usually assume that foreign owned firms will have higher productivity (Aitken, Harrison, 1999: 605). Firstly - superior (and possibly newer) production equipment (tangible assets) in physical form is transferred from the parent company to its FDI affiliate. Secondly, in addition to that, the foreign affiliate also receives an inflow of non-tangible assets from its parent – in form of technological know-how, superior management and marketing capabilities, trade cont(r)acts, co-ordinated network of relationships with suppliers and customers abroad etc. This all can, assuming that the local affiliate has absorptive

capabilities to use this know-how, give them significant competitive advantage if compared to domestic enterprises. Oulton (1998: 122, 144) also stresses that (based on data from UK) that foreign enterprises may face lower cost of capital as they are not constrained to borrow from the local financial system. The possible inability of domestic enterprises to borrow cheaper from abroad may reduce their ability to invest in superior technology (Oulton 1998: 144; Harris, Robinson 2001: 4).

The overwhelming majority of authors stress positive own-firm effects of FDI. However there exists also literature indicating the possibility of FIEs having lower productivity than DEs. According to Harris and Robinson (2001, p. 4) foreign-owned plants may have lower productivity levels (at least in short run) because of a time lag in assimilating new plants into the FDI network. This may be caused by big cultural differences between host and home country or also by hostile policies of host country government towards FDI.

Also the usual assumption is that MNEs are more prone to acquire local companies that have higher than average productivity (Damijan *et al.* 2003; Aitken, Harrison 1999: 606). Generally it is probably so, but in certain cases it might not hold. MNEs may also acquire "lemons" – i.e. firms with lower than average performance, instead of high productivity plants (Harris, Robinson 2001: 4), because either they are cheaper to buy or the buyer has less information about the company as the selling party (usual adverse selection problem of information asymmetries).

Other reasons why FIEs may sometimes have lower productivity levels than DEs include the nature and type of activity undertaken in the foreign-owned plant (Harris, Robinson 2001: 5). Foreign firms might keep most of their high value-added operations at home (e.g. R&D), concentrating lower value-added assembly operations in the host country (e.g. due to cost and labour quality differences). Thus the use of lower-skilled workers (who are paid also lower wages) and possibly inferior/older technology will contribute to potentially lower productivity. This is for example consistent with empirical evidence of Japanese *greenfield* investments in the US (Okamoto 1999).

There is also a growing literature that links exporting and productivity (Görg, Strobl 2001: 4, Gestrin 2001, Bernard *et al*. 1999, Delgado *et al*. 2001). Empirical work for

example on USA or Western-European countries suggests that the productivity levels of exporting firms are higher if compared to non-exporting firms (Bernard *et al*. 1999: 1, Delgado et al 2001: 397). The analysis in case of the UK suggests, that also productivity growth may be higher for exporters (Sgard 2001: 18). This is part of the reason (2nd half of it concerns positive spillovers) why export oriented FDI is generally considered better than non-export oriented FDI (Gestrin 2001: 2).

Although there are possible effects causing lower productivity in FIEs than DEs, the predominant conclusion from theoretical literature is that on average the "own-firm effect" of FDI on productivity is positive.

2.3. Spillovers from MNEs to local firms

Contemporary theory tells us, e.g. Aitken and Harrison (1999: 605), that the presence of multinational enterprise in host country can lead to technology transfer to domestic firms, i.e. to spillovers of FDI to local enterprises. If foreign firms introduce new products and/or processes in their affiliates in host country, domestic firms may benefit from the accelerated diffusion of new technology. As already mentioned, spillovers are said to take place when the MNEs cannot reap all the productivity or efficiency benefits that follow in the host country's local firms as a result of the entry or presence of MNE affiliates (Caves 1974: 176). Literature of FDI spillovers goes back to the earlier works of Caves (also MacDougall in 1960ies), 1971 and 1974, who identified various external effects when examining the general welfare impact of FDI (Blomström, Kokko 1996: 7).

The spillovers from inward foreign investment may be intra-industry (horizontal) or inter-industry (vertical) spillovers (Smarzynska 2002: 1). Intra-industry spillovers take place between companies in the same industry, vertical spillovers flow in direction of suppliers and customers (i.e. to backward and forward linkages) of the firm in consideration. Backward linkages (i.e. also the possibility for spillovers) exist in host economy when foreign affiliates acquire goods or services from local firms (UNCTAD 2001: 127). Forward linkages exist between FIEs and their distribution networks and customers. Linkages can be defined as transactions that go beyond arm's length, one-off relations (as in buying standardised products off the shelf) and involve longer-term

relations between firms (*Ibid.*: 127). Summary of these linkages and spillover effects is gathered into table 19 in annex number 1.

Based on articles by Caves (1974), Blonström and Kokko (1996: 8), Smarzynska (2001: 3), Aitken and Harrison (2001: 606-607), we can distinguish between following spillover effects: demonstration (or imitation), competition, worker mobility and supplier upgrading effects.

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: 7, UNCTAD 2001: 131). In other cases diffusion of new technologies and know-how may occur from labour turnover as employees (worker mobility effect in table 3) move from FIEs to DEs. Aitken and Harrison refer to studies as e.g. by Reinaldo Gonclaves (1985) that have shown that foreign firms in host country initiate more on-the-job training programs than domestic enterprises (Aitken, Harrison 1999: 605). If these people later change their workplace, take on a job in a DE, there may occur some positive spillover effect for this DE.

Another types of spillovers are the ones that work 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 2002: 4). This is rather important idea, as it influences significantly the studies on spillovers. 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, more efficient technologies (Blomström, Kokko 1996). This can have both positive (in case local firm manages to implement superior technologies due to increase in competition) and negative effects on the productivity of domestic (or more generally other local) enterprises. Positive effects of competition occur, if the threat of competition spurs firms that might otherwise been "laggards" to adopt best practice technology sooner than otherwise. Negative effects exist particularly in the short run (Aitken Harrison 1999: 607; Smarzynska 2002). Negative effects are possible due to the existence of fixed costs. If imperfectly competitive firms face fixed costs of production,

a foreign firm with lower marginal costs will have an incentive to increase production relative to its domestic competitors. In this environment, entering foreign enterprises producing for local market can draw sales and demand away from domestic firms, thus making them to cut production. The productivity of domestic firms would according to arguments of Aitken and Harrison (1999: 608) fall as they spread their fixed costs over a smaller market, forcing them back up their average cost curves. If the absolute value of this 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. This argument of two offsetting effects and its graphic presentation are obtained from Aitken and Harrison (1999: 608). In figure 3, positive spillovers cause the DE's average cost curve to fall from AC_1 to AC_2. The additional competition from FIE forces the DE to reduce its output and thus to move back up its AC_2 curve. The net effect can be negative, if fall in output is sufficiently high and the amount of technology transfer (and absorptive capacity of DE to implement this know-how) is restricted.

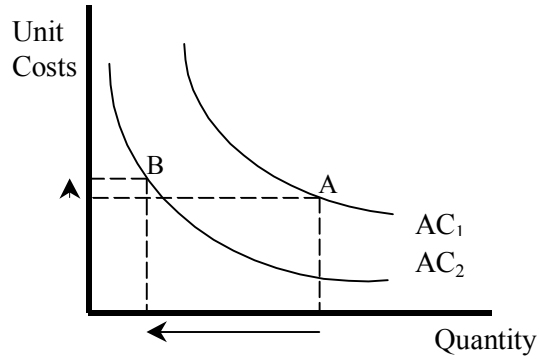

Figure 3. Output/cost response of domestic firms to entrance of MNE (Aitken, Harrison 1999: 607).

Also Görg and Greenaway (2002: 4) emphasise the role of competition. Unless an incoming firm is offered a monopoly status, it will produce in competition with indigenous firms. Even if the latter are unable to imitate the MNE's technology/production processes, they are certainly under pressure to use existing technology more efficiently, yielding productivity gains. Greater competition leading to

a reduction of inefficiency is analogous to one of the standard gains from arms length trade and is frequently identified as one of the major sources of gain. In addition, of course, competition may increase the speed of adoption of new technology or the speed with which it is imitated. (Görg, Greenaway 2002: 4,5).

These named types of spillovers are to some extent different for intra- and inter-industry cases and are summarised in the following table. Intra-industry spillovers do not encompass supplier upgrading and inter-industry ones the competition effect.

Table 3. Productivity related spillovers from FDI

	Spillover effects			
	Demonstration	Worker mobility	Competition	Supplier upgrading
Intra-industry	X	X	X	-
Inter-industry	X	X	-	X

Notes: X – exists, - does not exist
Source: Aitken, Harrison 1999: 605 - 608; Smarzynska 2002; Blomström, Kokko 1996: 7; Görg, Strobl 2001: 723-724.

The attitude of a MNE towards intra-industry spillovers can vastly differ from its' attitude towards inter-industry/vertical externalities. MNEs have an incentive to promote the latter (i.e. contacts with local suppliers and multinational clients) and prevent the former (Smarzynska 2002: 2), which is intuitively quite reasonable. Thus we come upon one conclusion that Beata Smarzynska (an economist at the World Bank) has made in her paper in 2002. Namely, that it is more likely to observe spillovers through vertical rather than horizontal channels (*Ibid.*: 2).

A further indirect source of productivity gain might be via export spillovers (Görg, Greenaway 2002: 4, Sgard 2001:18). Görg concludes that often domestic firms learn from multinationals how to export (for more reference see also the paper by Greenaway, Sousa and Wakelin 2002). Exporting generally involves fixed costs in the form of establishing distribution networks, creating transport infrastructure, learning about consumers' tastes, regulatory arrangements and so on in foreign markets. MNEs will generally establish an affiliate being already acquainted with such information and will often use it to export from the new host. Through co-operation, or more likely imitation, domestic firms can learn how to penetrate export markets. There is a growing literature

that links exporting and productivity (see Görg, Greenaway 2002: 4). It can be argued that productivity spillovers might be different for export oriented and domestic-market oriented FDI, especially in case when local procurement is widespread among export–oriented MNE affiliates. World Investment Report (WIR) 2002 (UNCTAD 2002: 221-248) discusses the possibly large benefits of specifically export-oriented FDI. They bring forward two reasons why targeted approach of host countries towards export-oriented FDI is reasonable. First, they argue, that a targeted approach can help countries achieve strategic objectives related to such aspects as employment, technology transfer, cluster and export development, in line with their overall development strategies. Second reason, that is named, is the increased competition for export-oriented FDI (*Ibid.*: 221). However, the author would like to argue here, that the effect (spillover, "own-firm") still depends largely on that what type of activities are transferred, regardless whether the affiliate sells to domestic or international markets. One cannot agree that it is automatically true that export-oriented FDI is more beneficial (as UNCTAD basically argues in WIR 2002). Ari Kokko together with Magnus Blomström has demonstrated (1996: 27), that the countries that choose to specialise in labour-intensive processes and components production for MNEs also have to take into account that these (export-oriented) affiliates are relatively "footloose". They have relatively few obstacles to move to the most favourable environment as for example the cost level of one host country grows. In addition to that, Gestrin has made a point (2001: 2) that it is difficult to make a clear distinction between FDI that is export-oriented and FDI that isn't since this orientation can change over time.

One possibility of spillovers has been left out from discussion so far, it has also not been named usually among the main types of spillover effects. This could be the cluster-building effect of FDI in host country (Blomström, Kokko 1996). Industry clusters are - by definition based on *The Competitive Advantage of Nations* of M. Porter - geographic concentrations of competing, complementary or interdependent firms (Porter 1998: 131-132, 148-152). World Investment Report 2001 says, that "clusters" are concentrations of firms in one or a few industries, benefiting from synergies created by a network of competitors, suppliers and buyers (UNCTAD 2001: p. xix). Clustering means that there is more probability of all kinds of above-named spillover types to occur, as firms are located geographically close to each other, have linkages with each other, observe and

depend on each other. Thus they can also absorb new ideas and technologies introduced by others faster than in the case there were no cluster. Concentrations of resources and capabilities as clusters are, can attract "efficiency seeking" FDI (and more and more FDI is of this type). It also helps to attract "asset seeking" FDI to the more advanced host economies. Clusters of innovative activities (as in Silicon Valley in California, Wireless Valley in Kista, Sweden or Zhong Guancum, a suburb of Beijing) have a distinct advantage in attracting such high value adding FDI (UNCTAD 2001, 2002). At the same time FDI adds to the cluster by joining it, this adds to its strength and dynamism – which in turn tends to attract even more new skills and capital, adding further to cluster development (UNCTAD 2001, p. xix). The question would be, how to distinguish the spillover effects of a cluster itself from the ones of FDI? There is probably no clear conclusion on that issue at present day.

Additional way how the existence or presence of MNEs in a country or a sector can influence other enterprises is sometimes by introducing a "dominant design" or even a standard into the market, that can force the other enterprises to copy the design of the MNE (not necessarily the best design or technology) or drop out of the market (good example on how a dominant design can affect development of a product for a long period of time, is the well-known QWERT keyboard case (Magnusson 1994: 35)). Adoption and spread of some dominant design of some enterprise in industry can mean that the rivalling (also sometimes possibly better) designs are beaten, e.g. by economies of scale of the MNE and/or by the reluctance switch to the alternatives by consumers. In this way a quasi- irreversible evolution path is created. (Andersen 1994: 52)

General conclusions from above discussion would be that spillovers can be negative as well as positive. It is also important to notice, that they may be also sector specific and region-specific (Pain 2002: 26). I.e. if empirical analysis even indicates positive spillovers in a country – e.g. Estonia as a whole, the picture can still look very different in different sectors or in different parts of host country. E.g. the effect of foreign presence on productivity can be quite different in Tallinn and in Ida-Virumaa county - as the OLI advantages that determine FDI and also types of spillover effects can be of varying importance in different parts of a country (as it is in different branches of economy).

There is additional vital remark on the reasons for positive correlation of FDI and productivity to be made. The evidence of positive FDI related spillover effects depends crucially on the following identification problem (see also various econometric textbooks on keyword "sample selection bias" or "sample selection", e.g. Greene "Econometric analysis", 1993, 2nd ed., pp. 708 – 713; Wooldridge "Econometric Analysis of Cross Section and Panel Data", 2002, pp. 581-585; also articles by Damijan *et al*. 2003: 11-13; Aitken and Harrison 1999: 606, and Smarzynska 2002). If foreign investment takes place to larger extent in more productive industries and into more productive firms (i.e. FDI is indeed attracted by more productive branches of economy and by more productive enterprises), then the correlation observed by the researcher in the empirical analysis between the presence of foreign firms and the productivity of domestically owned firms (spillover effect) and between presence of FDI in a firm and its productivity level ("own firm" effect) will overstate the positive impacts of foreign investment (Aitken, Harrison 1999: 606; Damijan *et al*. 2003: 11-13:, Smarzynska 2002). This caveat should be kept in mind when analysing the productivity effects of FDI as the causality can run in both ways between these two.

Main conclusion based on the theory of FDI effects on productivity is that reasons for spillovers and mechanisms by which they take place are still far from being clear for economists.

2.4. Previous empirical literature

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 developed as well as developing and transition countries. Significant differences in results from what one would expect based on policy literature have often been found, 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 host country have on average higher productivity levels than purely domestic enterprises (e.g. Harris, Robinson 2001: 7). The picture is however far more various in case one takes a look at empirical analysis of FDI spillovers.

Empirical literature shows, that there is little conclusive evidence to support the beneficial effects of FDI for the host country and thus to support the reasoning behind using incentives to attract FDI (Görg, Strobl 2001; Smarzynska 2002: 1). Some surveys reveal the existence of positive spillovers, others find negative spillovers while the rest find "mixed" results, see also table 20 in annex 2 (Görg, Strobl 2001: 724; Chudnovsky *et al*.: 2003: 4). The important conclusion from both theoretical and empirical literature is that productivity spillovers are difficult to measure (Krugman 1990: 53), because as Paul Krugman points out: *Knowledge flows… leave no paper trail by which they may be measured and tracked* (Krugman 1990: 53). For this reason the empirical literature tries to avoid the issue that is difficult to address, namely how productivity spillovers take place in reality, but 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 usually performed in the framework of econometric analysis (based on estimation of production function), in which 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 them is the presence of foreign firms (e.g. in sector, region etc) to study the spillover effects, another one is a variable indicating FDI presence in firm level (e.g. FDI dummy, that is equal to 1 in case the firm has FDI, Görg, Strobl 2001: 724 – 725). The presence of FDI in sector/regional level is measured by FDI's share in assets, sales, employment etc. The estimated econometric models in literature often use log-linear form of Cobb-Douglas production function.

The way the research is conducted vastly influences the results obtained and policy implications made. The findings of the literature overview of Görg and Strobl (2001: 723) show and stress that how the presence of multinationals is defined, and whether cross-section or panel data is employed, may have an effect on the results (see also table 20, annex 2). The (older) studies that have used case studies and cross-section data often find significant positive spillover effects related to FDI, newer studies using larger panel data and taking account for firm-specific time invariant effects, on the other hand more often find no significant spillovers to DEs or sometimes even negative spillovers (Smarzynska 2002: 2).

The first empirical study of productivity related spillovers of FDI was conducted by Caves in 1974, using cross-sectional industry level data data for Australia. He found evidence of positive spillovers. Caves used employment as a measure for FDI presence in industry (Görg, Strobl 2001: 725). Subsequent studies of similar kind were performed by Globerman for Canada (1979), Blomström and Persson (1983), Blomström (1986), Blomsztröm and Wolff (1994), Ari Kokko (1994, 1996) for Mexico, these studies also found positive horizontal spillover effects (see table 20 in annex 2). Ari Kokko *et al.* used establishment level cross-section data (as opposed to sector level data of former studies) for Uruguay and found positive spillover effects in 1996 (Kokko *et al.* 1996: 23-24). During 1994 – 1999 firm level cross section data was main type of data used in various studies of importance and positive impacts were quite uniformly found.

The second group of more recent articles uses panel data and more usually than not these authors find negative spillovers or no significant spillovers. The pioneering study, that had the novelty of using panel data, was made by Haddad and Harrison (1993) for Morocco. They used the enterprise level panel data of years 1985–1989, with assets as a variable used for measuring FDI presence. The total number of observations (firms) in their study was already 11722, whereas Caves in year 1974 had only 22 observations (sectors). The result of Haddad and Harrison was indicating negative spillovers (Görg, Strobl 2001: 724). The most quoted study that uses panel data for estimating productivity spillovers from FDI is that of Aitken and Harrison (1999). They analyse firm level panel data for Venezuela (years 1976-1989, total number observations is thus very high, 32,521) and find that MNE presence affected negatively the total factor productivity of local firms (Aitken, Harrison 1999: 605). Also Djankov and Hoekman (2000: 1) find negative spillovers for period 1992-96, based on 500 enterprises in Czech Republic. Important contribution of Aitken and Harrison (1999) is introducing control variables of sectoral nature into the analysis of spillovers. They show that if the sector in which the firm operates had not been taken account for, and given that FDI is mostly directed to those sectors where productivity is higher, the same study with the same model estimated would have led to exactly the opposite conclusion on Venezuela, i.e. positive spillovers would have been found (Aitken, Harrison 1999).

The more recent studies pay much attention to the role of absorptive capacity or learning ability of local firms in benefiting from presence of MNEs (Kinoshita 2000: 1-2, Damijan *et al*. 2003: 17-18). The domestic enterprises with better learning capabilities and those that engage in some sort of innovative activities may benefit more from FDI spillovers (Chudnovsky *et al*. 2003; Damijan *et al*. 2003). Also the size of technology gap between FIEs and DEs may affect the extent of spillovers, with too big gap (due to FDI concentrating into enclaves) meaning less spillovers (Blomström, Kokko 1996: 23). However, also in this field the results can vary a lot, e.g. results obtained by Damijan *et al*. (2003: 17-18) did not confirm the emphasised role of the innovation capabilities and absorptive capacities of local firms in transition economies.

Typical study of intra-industry spillovers estimates the equation similar to the form used by Aitken and Harrison (1999) to answer two questions (with additional features added according to the aim of particular research): 1) whether foreign equity participation is associated with an increase in the plant's productivity, and 2) whether foreign ownership in an industry affects the productivity of domestically owned firms in the same industry (Aitken, Harrison 1999: 607). The specification in case TFP related effects are studied, may look like following:

(7) $Y_{ijt} = C + \beta_1 DUMF_{ijt} + \beta_2 FDI\_sector_{jt} + \beta_4 X_{ijt} + \varepsilon_{ijt}$

Log output - Y_{ijt} (or sometimes output per number of employees if labour productivity effects are studied instead of TFP, in this case also inputs per number of the employees are included as independent variables) for plant i in sector j at time t is regressed on vector of inputs (X_{ijt}), and measures of foreign ownership in firm and sectoral level. $DUMF_{ijt}$ is dummy variable indicating whether the firm is FIE or DE, FDI_sector_{jt} is a measure of the presence of foreign ownership in the industry, defined differently in different studies, e.g. as a share of all FIE assets (or employment etc) in total assets of the sector. In case the own-firm effect of FDI is positive, the coefficient of $DUMF_{ijt}$ should be positive. In case the spillover effect of FDI is also positive, the coefficient of the variable FDI_sector_{jt} is positive. (Aitken, Harrison 1999: 607-608; Djankov, Murrell 2003: 743; Blomström, Kokko 1996).

Sector specific variables as e.g. some measure of competition are often included as additional independent variables in the estimation of the above production function. There is a substantial theoretical literature analysing the relationship between competition and enterprise efficiency (see for review - Djankov, Murrell 2002: 763). The general hypothesis is that increased competition stimulates improvements in productivity. Still, in case of transition economies, this effect could be also negative, particularly in the early stages of transition and in case of weak institutions (Djankov, Murrell 2002: 763), as excessive competition, especially from abroad, can destroy network capital and harm enterprise performance. Often the competition level in a sector is measured by the Herfindahl index or e.g. the percentage sales of top 2 (3, 5 etc) firms in the respective industry (*Ibid*.: 764-765). The Herfindahl index is a measure of industry concentration. The value of the index, H, is the sum of the squares of the market shares ($share_i$) of all firms in an industry:

$$(8)\ H = \sum_{i=1}^{n} (share_i)^2 .$$

There is a crucial difference between papers in the degree of attention paid to possible biases in the estimates, due to either firm selection effects and/or simultaneous causality (Djankov, Murrell 2003: 744). The most advanced paper taking these problems into account in analysis of productivity effects of FDI is certainly the one of Smarzynska (2002). The original papers that deal with the methods of accounting for these problems are these of Heckman (1979) and of Olley and Pakes - *The Dynamics of Productivity in Telecommunication Industry* (Olley, Pakes 1996). The evidence suggests that sample selection bias is likely in the analysis of the effects of FDI (or more generally the effects of different types of ownership) on performance of the firm (Damijan *et al*. 2003: 11-12). In case of sample selection bias, the problem is essentially that the FDI variable (e.g. FDI dummy) as a regressor is correlated with the error term, e.g. because more productive firms are more likely to become foreign. Heckman 2-step procedure (also called Amemiya prodecure) is sometimes used in order to correct for this problem in estimation (Damijan *et al.* 2003: 12). More on this issue will follow in the empirical part of the paper.

Whereas the analysis of intra-industry spillovers is already well established in literature, analysis of vertical spillovers is quite a new field, with the most important paper again written by Beata Smarzynska from World Bank (2002). For studying vertical spillovers input-output matrices of industries and also firm level import data are needed. The study of Smarzynska examines firm-level data from Lithuania. Empirical results of hers are consistent with the existence of productivity spillovers from FDI taking place through contacts between foreign affiliates and their local suppliers in upstream sectors, there is no indication found of spillovers occurring within the same industry. The Lithuanian data indicated that spillovers are not restricted geographically, since local firms seem to benefit from the operation of foreign affiliates both in their own region and in other parts of Lithuania. One result that is especially interesting for our analysis here and for Estonia is that Smarzynska found that greater productivity benefits are associated with domestic-market- rather than export-oriented foreign companies. (Smarzynska 2002: 1, 16-17)

In very recent literature (e.g. Wei, Liu 2003 or Driffield, Love 2003) also so-called reverse spillovers are discussed, i.e. spillovers from the DEs to the FIEs, that can take place at the same time as the ones from the FIEs to the DEs. One issue that is totally discarded in literature of the effects of FDI on productivity, is the influence of transfer pricing on FDI related productivity effects. This area deserves further theoretical analysis. To our knowledge there are no articles that connect these two fields. Transfer pricing may have some importance in case there exist relatively large differences in taxes between host and home countries of FDI. Transfer pricing is probably not a problem for looking at spillovers, although in a productivity comparison of foreign and domestic firms it probably might be, it might affect the analysis of differences of productivity in FIEs and DEs (and between export oriented and domestic market oriented FIEs).

3. EMPIRICAL ANALYSIS ON THE EFFECTS OF FDI ON PRODUCTIVITY IN ESTONIAN AND SLOVENIAN MANUFACTURING

3.1. Data and descriptive statistics

We could conclude from the previous parts of this research paper, that the "own-firm" and spillover effects of FDI have substantial theoretical background. So far, for Estonia and Slovenia, these effects have been estimated based on total factor productivity and without implementing the export/local market dimension (Damijan, Knell *et al.* 2003). The aim of this research is to find out the effects of FDI (both "own firm" effects and horizontal spillover effects) on labour productivity in Estonia and Slovenia, based on firm-level panel data of manufacturing industry from the 2nd part of 1990s to year 2001.

There are several reasons why these two countries are chosen for studying these effects of FDI. One of them was certainly the good availability of the data of Slovenia and Estonia for the author. Both of these countries are small and very successful transition economies, that have had substantially different transition paths over the years. Slovenia is the most developed transition country with GDP per capita near to the EU average level. The GDP per capita in Slovenia amounted for 11972 USD, whereas the GDP of Estonia was 4697 USD in 2003. Estonia has according to the Index of Economic Freedom the most free economy in Central and Eastern Europe with global rank of 6th position, as of year 2003. Slovenia, however is categorised by The Heritage Foundation and Wall Street Journal as "mostly free" among countries and ranks far below – on place 62 in the world based on its economic freedom (Index …, 2003: 175, 359).

Slovenia is a more developed country than Estonia also by the investment development path theory of Dunning and Narula (Varblane *et al*. 2001: 18-19; Rojec, Svetličič 2003), as in addition to higher GDP per capita, it also started investing abroad itself long before

Estonia and has far different track record of internationalisation. An overview of Slovenia's differences from other transition countries can be found from these two books: *Enhanced Transition Through Outward Intenationalization – Outward FDI by Slovenian firms* (edited by A. Jaklič and M. Svetličič, 2003) and *Fascilitating Transition by Internationalization – Outward Direct Investment from Central European Economies in Transition* (edited by M. Svetličič and M. Rojec, 2003). Estonia and Slovenia also adopted different privatisation strategies, have had different attitudes and policies towards FDI, with Estonia being much more FDI friendly than Slovenia (see e.g. *Index of Economic Freedom 2003*, country factsheets). Thus based on these differences, the author can argue that the effects of FDI on productivity can differ between Estonia and Slovenia and studying these two countries can offer interesting results and policy implications.

The author estimates log-linear production functions at the firm level using panel data to answer these questions:

1) is foreign equity participation associated with higher productivity of the plant (based on theory, positive "own-firm" effect of FDI is expected);
2) is there a difference in "own-firm" effect between export oriented and domestic market oriented FDI;
3) whether there exist productivity related positive or negative intra-industry spillover effects of FDI to:
    a) domestic enterprises;
    b) foreign affiliates (based on theory, we expect the presence of FDI in a sector to have positive effects on both DEs and FIEs).

The author takes a look at whether the "own -plant" productivity effects depend on the type of FDI. I.e. what is the role of export/local market orientation in productivity effects of FDI – is there a difference in "own-firm" effect between export oriented and domestic market oriented FDI. The exporting/local market dimension has been usually with few exceptions (like Sgard 2001; Harris, Robinson 2001; for spillovers also Smarzynska 2002), largely discarded so far in the analysis of FDI effects on productivity. The study has the novelty of adding the export/local market orientation

dimension to the analysis and the benefits of using enterprise level panel data instead of simple cross section data.

We distinguish between two dimensions: ownership, market (abroad, local):
DE- domestic enterprise (dumf=0[4]);
FIE - foreign investment enterprise (dumf=1);
DM - domestic market oriented enterprise (dumexp=0);
FM - foreign market oriented enterprise (dumexp=1), see also annex no 3.

Based on these two dimensions, the author distinguishes between 4 types of firms:
1) DE, DM (dumf=0, dumexp=0);
2) DE, FM (dumf=0, dumexp=1);
3) FIE, DM (dumf=1, dumexp=0);
4) FIE, FM (dumf=1, dumexp=1).

The author uses two data sets. Enterprise-level panel data on manufacturing industries in Slovenia and Estonia are used in order to study the productivity effects of FDI. The data stem from the Statistical Office of Slovenia and the Statistical Office of Estonia. For Estonia the panel consisted of yearly data of 326 firms over period 1996–2001. The initial number of enterprises in panel was 382 - over 50 firms were excluded for purposes of econometric analysis, because these firms either did not exist in the whole period of 1996-2001 (less than 10% of firms) or their field of activity was not manufacturing for the whole period. According to Olley and Pakes (1996: 1265) a traditional way of accounting for entry and exit when using firm level data, is to construct a "balanced" panel, keeping only those firms that operate the entire sample period, and then compute either the ordinary least squares (OLS) or some other more suitable estimator of the production function coefficients for panel data. However, the author also notes that this approach might also have some deficiencies, as the firms that operate over the whole period are the relatively successful ones. The least successful firms that went bankrupt are left out from analysis. The number of such firms excluded

[4] dumf – FDI dummy, =1 if the firm is foreign investment enterprise, =0 if it is domestic enterprise; dumexp – export orientation dummy, =1 if the firm exports at least 50% of its sales, =0 if it is more domestic market oriented.

from the analysis is relatively small, and the impact on the results a minor one, we suffice here with simply noting this fact.

Slovenian panel was significantly larger, it covered the yearly data of period 1994-2000 of 982 firms of manufacturing industry. The panel data for Slovenia is the data from the Statistical Office of Slovenia, the author owes thanks to professor Jože Damijan at Ljubljana University for help with obtaining the Slovenian data. In addition to the standard financial statement data, the datasets contain information whether foreign capital, if any, has been invested in each firm. However, the definition of foreign investment enterprise and domestic enterprise are different for the datasets of Estonia and Slovenia. For Slovenia, the usual (see chapter 2 for more information) definition of FDI recipient firms is used, FDI recipient firms are defined as firms with foreign share equal to at least 10% of ordinary shares or voting power. For Estonia, one cannot use that 10% level for all of the years. Due to the lack of data and differences in data for periods 1996-1999 and 2000-2001, it was not possible to calculate the share of FDI in ordinary shares or voting power for years 2000 and 2001. Thus the majority share dummy variable, that is possible to use from the database of Statistical Office of Estonia, is applied for all of the period. It is used instead of a FDI dummy variable for at least 10% level share or a continuous variable indicating FDI share in ordinary shares or voting power. Certainly the FDI dummy variable calculated for 10% level, would have been much more beneficial for the analysis, as foreign direct investment, that is smaller than majority share in a firm, can still influence the performance of the firm to a significant extent. Still, there are not too many firms with FDI in Estonia that have FDI share below 50%, as for example annual surveys of FDI by Estonian Investment Agency and Tartu University "Foreign Investor" have indicated (Varblane 2001). Also for years 1996–1999 (the years, for which the data allowing calculation of FDI dummy at 10% level exists) the difference in the number of firms with the majority FDI share and both majority and minority ownership is not too large (Vahter 2001). The databases for both Estonia and Slovenia also include information on exports and the share of exports in sales. For Estonia there exists also data for R&D expenditures, for Slovenia unfortunately not. For Slovenia a dummy variable for firms that have some sort of intangible assets (e.g. including goodwill, patents, licences etc) is included into our

estimated function. For neither of these countries there is any firm level imports data included in the datasets.

Table 5 presents the number of FIEs and their share in total number of firms over the studied period range of the two datasets. Both countries have growing FDI share in the number of firms in the sample, however in case of Estonia the FDI penetration rate is for all years about two times higher than in Slovenia. In year 2000, the share of FIEs in total number of enterprises was 23.3% in the Estonian sample and 12.8% in the Slovenian sample.

Table 5. Data description

	Number of FIEs		FIE share in number of firms	
Year	Estonia	Slovenia	Estonia	Slovenia
1994	…	91	…	9.3%
1995	…	94	…	9.6%
1996	69	101	21.2%	10.3%
1997	69	105	21.2%	10.7%
1998	72	110	22.1%	11.2%
1999	77	126	23.6%	12.8%
2000	76	126	23.3%	12.8%
2001	85	…	26.1%	…

Source: author's calculations based on panel databases of Slovenian and Estonian enterprises of manufacturing industries.

If one takes a look at the general FDI inflow data for all of the economy, for both countries, one can see that FDI indeed has a stronger role to play in Estonia. Inward FDI stocks reach 65.9% of gross domestic product in Estonia and only 23.1% of GDP in Slovenia in year 2002 (UNCTAD 2003). This percentage 65.9% for Estonia is also higher than e.g. the corresponding figure for Czech Republic (54.8%, in 2002), another transition country, that is an outstanding example in attracting FDI.

The FDI stock in Slovenia was 3.209 billion dollars in 2001 and 5.074 billion dollars in 2002. The corresponding figures for Estonia were 3.160 billion USD in 2001 and 4.226 billion USD in 2002. These figures also illustrate, if compared to the ratio of FDI stocks to GDP, the big differences between the GDP level (and per capita GDP) of Estonia and Slovenia (UNCTAD 2003). Following figures show the inflows of FDI in both countries, in millions USD. In case of Estonia, the record years in FDI inflows were the years 1998 and 2003, in 1998 mainly because of the acquisitions of the largest Estonian

banks by Swedish financial institutions. Until 2001, the inflow of FDI in Slovenia was significantly below that of Estonia (see figure 4). Also the privatisation strategies adopted by these two countries in 1990s had different effects on FDI inflow, Slovenia adopted more the sales to insiders approach, while Estonia adopted direct sales to strategic owner approach in the privatisation process. In addition the policies of governments have been traditionally much more FDI friendly in case of Estonia, e.g. no corporate income tax on reinvested earnings (this however applies to all firms not only FIEs).

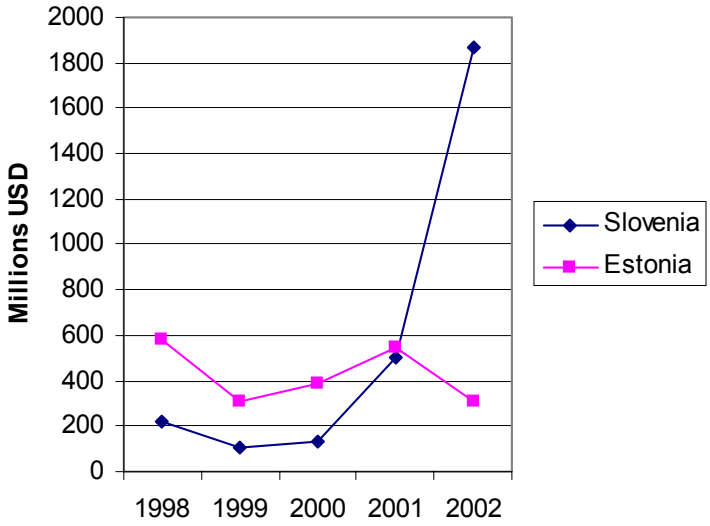

Figure 4. Inflows of FDI in Estonia and Slovenia, 1998–2002, million USD (UNCTAD 2002).

In year 2002 one can observe a huge jump in FDI inflows into Slovenia, to a truly unprecedented level for the country – almost 2 billion EUR. A great deal of that was accounted for by the take-over of *Lek*, a blue-chip pharmaceuticals enterprise (Slovenia – Your… 2003: 8). The majority of FDI inflows to both Estonia and Slovenia originate from the neighbouring Western-European countries. The geographical distribution of home countries of FDI inflows will not be studied further here.

The data of our two panels of enterprises has the same type of implications on analysis of differences between Estonia and Slovenia as the aggregate level data of these two transition economies. In Slovenia, inward FDI is far less spread in the economy than in

Estonia. Also the share of FIEs, measured by various indicators as employment, sales or value added are lower for Slovenia (see also tables 6 and 7).

Table 6. Descriptive statistics on the share of FDI in Slovenia

SLOVENIA	Year						
	1994	1995	1996	1997	1998	1999	2000
FDI share in sales	0.213	0.221	0.237	0.247	0.282	0.326	0.332
FDI share in exports	0.266	0.272	0.298	0.313	0.358	0.409	0.382
FDI share in employment	0.109	0.112	0.116	0.130	0.146	0.184	0.181
FDI share in value added	0.137	0.139	0.145	0.159	0.179	0.222	0.219
FDI share in tangible fixed assets	0.165	0.162	0.180	0.204	0.212	0.243	0.241
FDI share in number of firms	0.093	0.096	0.103	0.107	0.112	0.128	0.128

Source: author's calculations based on panel database of Slovenian enterprises of manufacturing industries, 1994-2000.

According to the year 2000 data from the Institute of Macroeconomic Analysis and Development, 4.3% of all companies in Slovenia were in foreign ownership (Slovenia – Your…, 2003: 9). These enterprises hold 13% of all assets, employ 10% of the employees in Slovenia, generate however even 20% of aggregate operating profit and account for 29.7% of Slovenia's exports. The analysis of descriptive statistics of the Slovenian panel of enterprises active in the manufacturing sector shows that the share of FIEs in the number of firms was 12.8%. These firms gave 33.2% of sales, 38.2% of exports, 18.7% of employment, 21.9% of value added and 24.1% of tangible fixed assets (table 6).

In Estonia, in manufacturing industry, the share of the FIEs in the number of firms was 26.1% in our panel, these firms gave 47% of sales; 58.5% of exports; 39.4% of employment; 42.5% of R&D costs (see table 7). I.e. as in case of Slovenia, also in Estonia the FIEs are larger than DEs and indeed more export oriented. They also tend to spend more on R&D per enterprise than DEs. In case the aggregate sector level data is used, the share of FIEs in the number of enterprises in Estonian manufacturing is found to be smaller - 9,8%. On average these enterprises are larger than DEs, they employ 27% of people active in manufacturing, have a share of 34.3% of sales, are more export oriented - 44.8% of exports. FIEs also spend 37% of all R&D costs of enterprises in manufacturing and own 40% of tangible assets (author's calculations, based on sector level database of Estonian manufacturing, 2000).

Table 7. Descriptive statistics on the share of FDI in Estonia

ESTONIA	Year					
	1996	1997	1998	1999	2000	2001
FDI share in sales	0.305	0.308	0.336	0.386	0.397	0.466
FDI share in exports	0.377	0.379	0.426	0.486	0.509	0.585
FDI share in employment	0.215	0.233	0.263	0.316	0.335	0.394
FDI share in R&D costs	0.529	0.462	0.486	0.470	0.257	0.425
FDI share in value added	0.278	0.285	0.307	0.360	0.406	0.487
FDI share in tangible fixed assets	0.528	0.478	0.452	0.485	0.478	0.544
FDI share in number of firms	0.212	0.212	0.221	0.236	0.233	0.261

Source: author's calculations based on panel database of Estonian enterprises of manufacturing industries 1995 – 2001.

Some of the most important and largest foreign affiliates in manufacturing in Slovenia are (in alphabetical order: company, products, investor, home country of the investor):

a) Danfoss Compressors; producing compressors; investor – Danfoss, Denmark;
b) Henkel Slovenija; cosmetics, toiletries; Henkel, Germany;
c) Iskratel; telecommunications; Siemens, Germany;
d) Julon; synthetic fibres and polymers; Gruppo Bonazzi, Italy;
e) Lek; pharmaceuticals; Novartis, Switzerland;
f) Papirnica Vevče; paper and paperboard; Birgl & Bergmeister, Austria;
g) Pivovarna Union; beer; Interbrew, Belgium;
h) Revoz, motor vehicles; Renault, France;
i) Sava Tires; rubber tyres; Goodyear, USA;
j) Tobačna Ljubljana; tobacco products; Imperial Tobacco, UK;
k) Vipap; pulp and paper; Československo Obhodni Banka, Czech Republic.

In fact, the FDI in Slovenia has been concentrated into relatively small number of large enterprises. In Estonia also smaller FIEs are quite common. Some of foreign affiliates active in manufacturing in Estonia are (firm, activity, investor, home country):

a) Elcoteq Tallinn AS; field of activitiy – electronics manufacturing services (EMS); Elcoteq OY; home country of investment is Finland;
b) Galvex Estonia OÜ; galvanisation of metals; private persons from US, USA;
c) Kreenholmi Valduse AS; textiles; Borås Wäfveri AS, Sweden;
d) Saku Õlletehas AS; beer and soft drinks; Baltic Beverages Holding AB, Sweden;

e) Stora Enso Estonia AS; wood processing, timber; Stora Enso Timber OY Ltd, Finland;
f) Tartu Õlletehas AS, beer and soft drinks; OLVI OY, Finland;
g) Valga Gomab Mööbel AS, furniture, Gomab Scandinavia AB, Sweden.

In tables number 8, 9 and 10 the descriptive statistics on productivity in manufacturing sector of Estonia and Slovenia are presented, based on enterprise level panel data. Firstly, the tables describe differences between productivity levels of FIEs and DEs, secondly between export oriented and domestic market oriented firms. Thirdly, between 4 types of firms under consideration in this study – home market oriented domestic enterprises; export oriented domestic enterprises; foreign affiliates that are domestic market oriented; foreign affiliates that are export oriented. For Estonia, also information on capital-labour ratio and capital productivity is included. Productivity is measured as sales per employee or value added per employee. In case of Estonia, it is also interesting to take a look at the data, if a very large foreign affiliate of Elcoteq in Estonia (a well known foreign EMS company active in Estonia, among the largest firms in Estonian manufacturing) is excluded from the analysis.

Table 8 and 9 show that foreign affiliates have significantly higher labour productivity in Estonia than domestic enterprises. This result holds both for the value added and the sales based approach to labour productivity measurement. In 2001, the labour productivity of DEs as sales per employee in Estonian manufacturing was (based on panel of 326 enterprises) on average 479.04 thousand kroons. In FIEs however the same figure amounted for 643.89 thousand kroons, i.e. was 1.344 times higher than the labour productivity level of DEs. In 1996 the corresponding figures were, 253.19 for DEs, 407.31 for FIEs and the ratio FIE to DE was then higher than in 2001 – FIE level of productivity surpassed that of DEs by 1.609 times. This big difference in productivity between those two types of enterprises is also seen in case 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 capital-labour ratio is even more overwhelming than in productivity of labour. FIE/DE ratio of K/L ratio is

1.834 in 2001 and in 1996 even as high as 4.092. This means that in 1996, FIEs used 4 times more capital per employee in production than local companies. This ratio has however (see table 8) fallen significantly over the years, as the K/L ratio of DEs has due to investments into physical capital grown rapidly over the years (122% over the period 1996 – 2001) and that of FIEs has stayed roughly the same over the years. The capital productivity (in case measured as sales/tangible fixed assets) is higher in DEs than in FIEs, which is quite understandable if we again consider the differences in K/L ratio, as DEs have also less capital per employee (i.e. or more labour per unit of capital).

One important question is, whether there has been any convergence in labour productivity levels between FIEs and DE. The results of the analysis depend on which indicator from table 8 and 9 is used as a measure for labour productivity. If sales per employee is used, one can witness rapid convergence in the productivity levels in Estonian manufacturing, as the productivity of DEs grows faster than that of FIEs, correspondingly 89% and 58% over the period. In case the value added per employee is employed as an indicator, there is no convergence to be witnessed at all. The productivity of FIEs is over 40% higher than the level of DEs in both year 2001 and 1996. From table 8 we can also see, that FIEs are in our panel more export oriented than DEs, with the exports/sales ratio of the former - 65.9% and of the latter - 40.9%.

In case of Slovenia - we, like in case of Estonia, witness that the labour productivity level of FIEs is on 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 case of Slovenia than in case of Estonia. In Slovenia, unlike in Estonia, one cannot see any convergence of FIE/DE ratio of productivity of labour over the years 1994-2000, the productivity of DEs and FIEs grows about the same percentage over the period.

In tables 9 and 10 the author calculates the productivity levels for 4 types of enterprises under consideration in this paper – according to these two dimensions: foreign capital existence (either the (in case of Estonia the majority) FDI dummy=1 or 0) and export/local market orientation (either export orientation dummy variable=1 or 0).

Table 8. Estonia, productivity differences between FIEs and DEs, thousand kroons

Estonia		Year						Growth (%) 2001/1996
DUMM	**Data**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	
0	**Productivity (sales/empl)**	253.19	327.31	349.92	349.35	415.42	479.04	89.20%
1	**Productivity (sales/empl)**	407.31	479.75	496.91	474.65	542.21	643.89	58.09%
Total	**Productivity (sales/empl)**	286.27	362.85	388.55	388.98	457.95	544.01	90.03%
0	**Productivity(VA/empl)**	61.15	80.83	82.81	87.63	98.89	103.82	69.76%
1	**Productivity(VA/empl)**	86.20	106.04	102.68	106.74	134.17	151.24	75.46%
Total	**Productivity(VA/empl)**	66.53	86.71	88.03	93.67	110.72	122.51	84.14%
0	**K/L ratio (TFA/empl)**	64.23	78.56	102.89	117.66	129.03	142.99	122.63%
1	**K/L ratio (TFA/empl)**	262.84	236.81	237.70	239.92	233.79	262.28	-0.21%
Total	**K/L ratio (TFA/empl)**	106.86	115.45	138.31	156.33	164.17	190.00	77.81%
	FIE/DE, PROD (sales/empl)	1.609	1.466	1.420	1.359	1.305	1.344	-16.45%
	FIE/DE, PROD (VA/empl)	1.410	1.312	1.240	1.218	1.357	1.457	3.36%
	FIE/DE for K/L ratio	4.092	3.014	2.310	2.039	1.812	1.834	-55.18%
	FIE/DE for exp/sales ratio	1.379	1.371	1.466	1.506	1.576	1.611	16.86%
	FIE/DE for Cap.prod (sales/empl)	0.393	0.486	0.615	0.666	0.720	0.733	86.42%
0	**Capital productivity (sales/tfa)**	3.94	4.17	3.40	2.97	3.22	3.35	-15.02%
1	**Capital productivity (sales/tfa**	1.55	2.03	2.09	1.98	2.32	2.45	58.42%
Total	**Capital productivity (sales/tfa)**	2.68	3.14	2.81	2.49	2.79	2.86	6.87%
0	**Exports/Sales**	0.434	0.453	0.405	0.406	0.425	0.409	-5.58%
1	**Exports/Sales**	0.598	0.621	0.594	0.612	0.669	0.659	10.34%
Total	**Exports/Sales**	0.484	0.505	0.469	0.485	0.522	0.526	8.76%
	Year	1996	1997	1998	1999	2000	2001	Growth (%) 2001/1996

Definitions: dumm: FDI dummy (=1, if at least 50% of voting power belongs to foreign investor, else =0).
FIE- foreign investment enterprise; DE - domestic enterprise; empl - number of employees; VA - value added; tfa - tangible fixed assets.
Source: author's calculations, based on enterprise level panel database of Estonian manufacturing, 1995-2001.

Table 9. Estonia, productivity differences between the 4 types of firms, thousand kroons

Estonia, 1000s kroons			Year						Growth (%) 2001/1996	Ranks 96-97	Ranks 98-99	Ranks 00-01
DUMM	DUMEXP	Data	1996	1997	1998	1999	2000	2001				
0	0	Productivity (sales/empl)	297.79	397.72	447.12	436.12	499.26	538.16	80.72%	3	2	2
0	1	Productivity (sales/empl)	216.51	275.09	264.33	276.93	349.82	425.09	96.33%	4	4	4
1	0	Productivity (sales/empl)	623.19	738.92	884.02	802.33	943.91	1115.55	79.01%	1	1	1
1	1	Productivity (sales/empl)	334.81	399.26	388.30	373.70	452.07	532.20	58.96%	2	3	3
0	0	Productivity (VA/empl)	64.17	81.96	91.09	96.45	103.84	109.37	70.44%	3	2	3
0	1	Productivity (VA/empl)	58.67	79.99	75.51	80.26	95.01	98.75	68.30%	4	4	4
1	0	Productivity (VA/empl)	118.01	135.15	160.63	154.31	198.28	206.40	74.90%	1	1	1
1	1	Productivity (VA/empl)	75.51	97.00	86.42	92.08	119.78	138.18	82.99%	2	3	2
DUMEXP=	0	Productivity (sales/empl)	340.79	447.10	509.57	506.87	576.66	657.69	92.99%			
DUMEXP=	1	Productivity (sales/empl)	248.64	310.82	306.93	315.01	393.13	478.80	92.57%			
DUMEXP=1/DUMEXP=0 ratio of productivity (sales/empl)			0.730	0.695	0.602	0.621	0.682	0.728	-0.22%			
FIE/DE ratio of productivity (sales/empl)			1.609	1.466	1.420	1.359	1.305	1.344	-16.45%			
FIE/DE ratio of productivity (VA/empl)			1.410	1.312	1.240	1.218	1.357	1.457	3.36%			
Without Elcoteq:												
1	1	Productivity (sales/empl)	366.15	458.25	435.20	426.20	521.87	588.16	60.63%			
1	1	Productivity (VA/empl)	77.63	102.22	90.65	97.21	129.20	145.75	87.74%			
FIE/DE ratio without Elcoteq		Productivity (sales/empl)	1.728	1.637	1.570	1.519	1.481	1.470	-14.93%			
FIE/DE ratio without Elcoteq		Productivity (VA/empl)	1.452	1.377	1.310	1.290	1.461	1.532	5.49%			

Definitions: dumm: FDI dummy (=1, if at least 50% of voting power belongs to foreign investor, else =0);
DUMEXP: export orientation dummy (=1, if share of exports in sales is at least 50%, else =0;
FIE- foreign investment enterprise; DE - domestic enterprise; empl - number of employees; VA - value added.
Source: author's calculations, based on enterprise level panel database of Estonian manufacturing, 1995-2001.

Table 10. Statistics - Slovenia, productivity differences between 4 types of firms, thousand tolars

Slovenia, 1000s tolars			Year									
DUMF	**DUMEXP**	**Data**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**Growth (%) 00-94**	**Ranks 94-98**	**Ranks 99-00**
0	**0**	**Productivity (sales/empl)**	6758.82	7553.37	8724.39	10508.48	10882.98	11638.99	13320.83	97.09%	3	3
0	**1**	**Productivity (sales/empl)**	5497.96	6064.97	7044.16	8356.03	9221.61	9483.39	11778.55	114.23%	4	4
1	**0**	**Productivity (sales/empl)**	11848.61	14701.67	16197.81	18419.87	20521.82	22632.56	42820.39	261.40%	2	1
1	**1**	**Productivity (sales/empl)**	13984.72	15137.36	18682.93	20455.90	22940.59	21986.81	25073.51	79.29%	1	2
TOTAL of DE		**Productivity (sales/empl)**	6011.42	6643.16	7671.62	9095.74	9826.53	10295.52	12348.97	105.43%		
TOTAL of FIE		**Productivity (sales/empl)**	13338.70	15024.51	18078.52	20071.20	22513.21	22118.15	27792.78	108.36%		
FIE/DE ratio of productivity (sales/empl)			2.219	2.262	2.357	2.207	2.291	2.148	2.251	1.43%		
DUMEXP=	**0**	**Productivity (sales/empl)**	7180.98	8105.99	9314.67	11106.85	11622.32	12830.90	15793.45	119.93%		
DUMEXP=	**1**	**Productivity (sales/empl)**	6561.77	7263.75	8641.21	10235.55	11710.72	12278.48	14820.98	125.87%		
DUMEXP =1/DUMEXP=0 ratio of productivity (sales/empl)			0.914	0.896	0.928	0.922	1.008	0.957	0.938	2.70%		

Definitions: DUMF: FDI dummy (=1, if at least 10% of voting power belongs to foreign investor, else =0);
DUMEXP: export orientation dummy (=1, if share of exports in sales is at least 50%, else =0;
FIE- foreign investment enterprise; DE - domestic enterprise; empl - number of employees; VA - value added.
Source: author's calculations, based on enterprise level panel database of Slovenian manufacturing, 1994-2000.

For comparison purposes, the results for Estonia are also given without Elcoteq. The inclusion/exclusion of Elcoteq quite significantly affects the descriptive statistics of productivity of export oriented foreign affiliates. It can be argued that it would even more affect the export volume related indicators, this analysis, however interesting, is beyond the purpose of the paper.

Among the 4 types of firms, in 2001 in Estonia, the lowest productivity is found in domestic enterprises that produce predominantly for export markets – in year 2001, sales per employee was 425.09 thousand kroons, value added per employee was 98.75 thousand kroons.

The ranking of the 4 types of firms under consideration (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):

1) domestic market oriented FIEs;
2) domestic market oriented DEs;
3) foreign market oriented FIEs;
4) foreign market oriented DEs.

The highest labour productivity is to be found in domestic market oriented FIEs, even 1115.55 thousand EEK in 2001 (if sales/employees is used as a productivity measure). The second and third place in productivity ranking of these 4 types of enterprises go to domestic market oriented domestic enterprises and foreign market oriented foreign enterprises, with productivity levels far behind the leading group – the domestic market oriented FIEs, but still higher than that of export oriented domestic enterprises. This ranking changes a little bit during the years with respect to the 2nd and 3rd place, the 1st and the last place remain the same over the years (see table 9). The main conclusion from table 9 is that in Estonia, export orientation of a firm means on average 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 manufacturing sector, except for market oriented FDI, has been to benefit from the low labour costs of Estonia.

Former empirical studies have stressed already for several years (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 this productivity difference is there due to only domestic market oriented firms, whereas export oriented foreign affiliates have more than two times lower indicators (in 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 the domestic market oriented DEs. In period 1998–2001 it is even below that (already relatively low) level.

The author has computed the productivity indicators for export oriented foreign affiliates and the FIE/DE ratio of labour productivity also without the electronics manufacturing services provider Elcoteq (a big company with 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 before. The labour productivity (sales per employees) is now 588.16 thousand EEK in this group of firms for 2001. Before the exclusion of Elcoteq from our sample, the corresponding figure amounted for 532.20 thousand EEK. This means that Elcoteq, with relatively low productivity, has - due to its size, big impacts 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 10. One can see here significant differences from Estonia. The rankings of firms by type differ also between period 1994–1998 and 1998–2000. In the former period, the ranking, starting from the group of firms with the highest labour productivity (sales per employee) is the following:

1) foreign market oriented FIEs;
2) domestic market oriented FIEs;
3) domestic market oriented DEs;
4) foreign market oriented DEs;

Starting from the years 1999 and 2000, the first and second of these groups changed their positions (sales per employee in 1999 and 2000 are included in parenthesis):

1) domestic market oriented FIEs (in 1999 – 22632.56 th. tolars; in 2000 – 42820.39 th. tolars);
2) foreign market oriented FIEs (in 1999 – 21986.81 th. tolars; in 2000 – 25073.51 th. tolars);
3) domestic market oriented DEs (in 1999 – 11638.99 th. tolars; in 2000 – 13320.83 th. tolars);
4) foreign market oriented DEs (in 1999 – 9483.39 th. tolars; in 2000 – 11778.55 th. tolars).

Based on the figures from table 10, 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. In case the years 1999 and especially year 2000 with peculiarly high growth of indicators are excluded, we can conclude that export oriented FIEs have the highest level of productivity among the 4 types of firms. Quite similar level (in 1999 and 2000 also higher) is found for the domestic market oriented FIEs. The DEs, regardless whether export oriented or domestic market oriented, lag far behind. The DEs, that are export oriented, have however the lowest productivity level among the firms. In analysis of the results from table 10, some caution is advised for discussing implications concerning year 2000. This big leap in productivity level of top 1 group in 2000 – domestic market oriented foreign firms, can be attributed to a small number of firms, also measurement error cannot be ruled out.

The results in table 10 for Slovenia and table 9 for Estonia are in sharp contrast in case the ranking of export oriented FIEs is studied. The reasons for Slovenia having this group of enterprises as a top performer and Estonia having it as a low productivity group lay to a large extent in different location specific advantages that these two countries provide for the investors. The reasons for the presence of such differences between Estonia and Slovenia are summarised in following tables number 11, 12, 13 and 14.

Table 11. Factors having effect on foreign investors initial decision to invest in Estonia, 2000 (1 – not significant motive… 5 – significant motive)

Production costs	3.54
Possible growth of market	3.44
Free movement of capital	3.43
The convertibility of Estonian kroon	3.31
Political stability	3.29
Rapid economic reforms	3.26
Entering Estonian market	3.11
Potential of CEE markets	2.50
Perspective of CIS markets	2.33
Following competitors	2.30
Perspective of joining the EU	2.19

Source: survey "Foreign Investor 2000" by Estonian Investment Agency and University of Tartu (Varblane 2001); the number of FIEs in the survey was 81.

Based on the information from the investor motivation surveys from Estonia and Slovenia (see tables 11 and 12) we find that there are large differences in main motives of FDI between those two countries. In Estonia, for years the cutting of production costs issue (incl. labour costs) has been one main motivator behind doing FDI into Estonia.

Table 12. Motives of foreign investors in Slovenia

Motive	% of FIEs quoting individual motive*
Access to Slovenian market	41.5
Access to other markets	36.3
Technology and know-how	29.8
Quality of labour	**26.9**
Financial support	25.1
Recognised trade-mark	17.0
Purchasing of material and parts	10.5
Low costs of labour	**1.8**
Acquisition of company in bankruptcy procedure	1.8
Other	7.0

* based on a survey of 183 FIEs, 1998. Source: *Foreign direct investments in Slovenia*... 2002: 14.

Surveys on the motivation of foreign investors in investing in Slovenia on another 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 (see table 12). This is not surprising, as labour costs in Slovenia are the highest among the transition countries in Central and Eastern Europe, far higher than in Estonia (see tables 13 and 14; Foreign direct investments in Slovenia 2002: 17). The average monthly wages in Slovenian manufacturing were 2.3 times higher than in Estonia in year 2002. For comparison of

wages between the sub-sectors of manufacturing between Estonia and Slovenia, see annexes 4 and 5.

Table 13. Average monthly wages in manufacturing

	2000	2001	2002
Estonia, EUR	309.6	341.1	376.1
Slovenia, EUR	763.1	820.0	868.0
Ratio SLO/EST	2.47	2.40	2.31

Source: data from Statistical Office of Estonia, Statistical Office of Slovenia, author's calculations, the yearly average exchange rate of Slovenian tolar was used in currency conversion calculations.

The comparison of labour productivity and costs with the level of EU average, shows that in both productivity and remuneration of labour Estonia reaches only 26%, whereas labour in Slovenian manufacturing is far more expensive – productivity 58% of EU level and remuneration 56% of EU level (table 14).

Table 14. Labour productivity and remuneration in 1998 in CEEC (EU15= 100)

	Manufacturing		Total economy	
	Productivity	Remuneration	Productivity	Remuneration
Bulgaria	20	21	25	24
Czech Republic	53	46	58	60
Estonia	**26**	**26**	**37**	**33**
Hungary	49	41	58	50
Latvia	29	26	27	27
Lithuania	30	24	30	28
Poland	38	38	38	44
Romania	31	..	32	..
Slovakia	42	32	53	40
Slovenia	**58**	**56**	**71**	**70**

Source: Eurostat news release No 55/2001 – 22 May 2001.

The analysis of descriptive statistics for Estonia and Slovenia has shown that these two countries differ a lot in "own-firm" effects of FDI. Estonia has export oriented foreign firms (also export oriented DEs) as productivity "laggards". In Slovenia the opposite is true, export oriented FIEs are top performers in labour productivity of manufacturing in this most developed transition country in Central and Eastern Europe.

3.2. General model

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 dependent variable are given per employee, i.e. dependent variable is not output as e.g. in Aitken, Harrison, 1999, but sales per number of employees – i.e. a measure of labour productivity, input variables include thus capital-labour ratio (K/L), materials per employee etc. Also the dummy variable $DUMEXP_{ijt}$ is included for export oriented firms (=1 if firm's ratio of ($export_{ijt}/sales_{ijt}$)is higher than 50%). The following model is estimated:

(9) $Y_{ijt} = C + \beta_1 DUMF_{ijt} + \beta_2 DUMEXP_{ijt} + \beta_3 DUMEXP_{ijt} * DUMF_{ijt} + \beta_4 FDI\_sector_{ijt} + \beta_5 DUMF_{ijt} * FDI\_sector_{ijt} + \beta_6 X_{ijt} + \beta_7 Z_{jt} + \varepsilon_{ijt}$.

Log sales per number of employees, $Y_{ijt} = log(sales_{ijt}/employees_{ijt})$, for firm i in sector j at time t (deflated by the Producer Price Index) is regressed on vector of inputs per employee (X_{ijt} , these are given all in log-s, including also materials), sector dummies - $Z_{jt,}$ export orientation dummy and its interaction dummy with measure of FDI, measures of foreign ownership $DUMF_{ijt}$ and FDI_sector_{ijt} . Vector of inputs X_{ijt} includes variables as $LNMFA_{ijt}$, $LNLABC_{ijt}$, $LNMATER_{ijt}$, $DUMINT_{ijt}$ (for Slovenia) or $DUMRD_{ijt}$ (for Estonia), these variable names used in regression analysis are defined below. C is constant and ε_{ijt} is the error term.

Dependent variable: Y_{ijt} – logarithm of (sales per employee) as a measure of labour productivity.

Independent variables:

$DUMF_{ijt}$ – FDI dummy variable, this variable identifies whether or not a firm has FDI (the treshold level is 10% in voting power of the firm). $DUMF_{ijt}$=1 if the firm is FIE, $DUMF_{ijt}$=0 if it is domestic firm. If foreign ownership in the firm increases that firm's productivity, we should observe a positive coefficient of $DUMF_{ijt}$.

$DUMEXP_{ijt}$ – export orientation dummy. $DUMEXP_{ijt}$=1 if firm has share of its exports in its sales higher than 50%, if else $DUMEXP_{ijt}$=0. As exporting may have positive effect on labour productivity, we expect this variable to have positive coefficient.

$DUMEXP_{ijt}$*$DUMF_{ijt}$ – interaction dummy between $DUMF_{ijt}$ and $DUMEXP_{ijt}$ in order to capture interaction effects. It allows us together with the variables $DUMEXP_{ijt}$ and $DUMF_{ijt}$ to distinguish between the 4 types of enterprises, see also annex 3. 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_sector_{ijt} – 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.

(10) $\text{FDI\_sector}_{ijt} = \sum_k assets_{ijt} \Big/ \sum_l assets_{ijt}$;

where $k = i \; for \; all \; i \in j \;\; and \; DUMF_{ijt}=1$,

$l = i \; for \; all \; i \in j$.

This indicator FDI_sector_{ijt} 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.

$DUMF_{ijt}$* FDI_sector_{ijt} – the coefficient on the interaction between plant-level and sector level FDI. It allows us to determine if the effects of foreign presence on other foreign firms differ from the effects on domestic firms.

$LNTFA_{ijt}$ – log (tangible fixed assets per employee), proxy for logarithm of (K/L) ratio.

$LNLABC_{ijt}$ – log (labour costs per employee).

$LNMATER_{ijt}$ – log (materials/ no of employees).

$DUMINT_{ijt}$ – dummy variable, =1 if firm has intangible fixed assets, == if it has not.

Sector dummy variables – used in order to capture sector specific effects.

Year dummy variables – used in order to account for trend effects.

$MILLS_{ijt}$ – the inverse of Mill's ratio, used in Heckman type 2-step procedure in order to account for sample selection bias in estimation, see more information below in following 3.3 and in annex 6.

3.3. Econometric concerns

The use of panel data has several benefits over usual cross section data (see e.g. Greene 1995, Wooldridge 2002). By using panel data it is possible take account for individual heterogeneity of objects in analysis (by e.g. the absorptive capacities firms etc). The easiest way to account for heterogeneity would be e.g. including separate dummy variable for each object in the model. Secondly, panel data gives simply more information on data, more variety, less collinearity between variables, much more degrees of freedom and better efficiency of estimators (Wooldridge 2002; Greene 1993; Baltagi 2001). For more on benefits of panel data, consult some of the following books: Wooldridge "Econometric Analysis of Cross Section andPanel Data", 2002; Hsiao "Analysis of Panel Data", 1999 or Baltagi "Econometric Analysis of Panel Data", 2001.

Some econometric concerns need to be addressed before estimating the general model of our study. First one is the choice of the method for estimation, based on the panel data for Estonia and Slovenia: whether one should use the simple pooled least squares model (pooled LS) or random effects or fixed effects model (see also Wooldridge, Greene on this issue). The first of these named here – pooled LS - has a multitude of disadvantages in case panel data is used. Pooled LS does not take into account the time-invariant firm-specific effects that are likely to exist if the researcher employs panel data. Not taking these effects into account (if they exist), i.e. just running OLS for pooled data, would lead to biased and inconsistent estimation results. The common remedy could be using random effects (RE) or fixed effects (FE) models instead. These both include object-specific time-invariant effects, but have different assumptions on the essence of these object-specific effects. The FE model assumes that differences across units can be captured in differences in the constant term. The fixed effects model

is a reasonable approach when the researcher can be confident that the differences between firms can be viewed as parametric shifts of the regression function (Greene 1993: 466). In case of random effects model, individual/firm specific constant terms are viewed as randomly distributed across cross-sectional units (*Ibid.*: 469). The inevitable question is which approach should be used? There are different views, as e.g. Mundlak (1978) argues that one should always treat individual effects as random (Greene 1993: 479). On the other hand, FE models have big virtues over RE models, as RE models (in case the individual effects are indeed correlated with other regressors, unlike the assumption of RE model) may suffer from the inconsistency due to omitted variables (Wooldridge 2002).

One way of choosing between RE or FE model, is by looking at the panel data used in analysis. In case we have a sample of micro data as a random draw from population, RE model might be appropriate. Thus this reasoning suggests RE model for our analysis. In addition, there is a formal approach to the question. To test, whether RE or FE model is favoured, the Hausman specification test can be used (Wooldridge 2002). When choosing between the RE or FE model, we have to keep in mind, that for the FE model we cannot find the effect of these variables that are constant for the object over the panel range (in our case possibly the sector dummy variables, for those enterprises that do not move between categories of firms FIE and DE also the FDI dummy), as these are differenced out. In case of the random effects model, one can also find these effects. The implication for our analysis is that FE and RE models are different in the sense, that FE model takes into account only the dummy variables for those firms for which the value of FDI dummy and export orientation dummy changes over the period, RE model uses dummy variables of all firms. This means that in case of FE model, a substantial part of information in the data is left unused. Fixed effect estimator uses only the across time variation, which tends to be much lower than the cross section one (Arnold 2003: 3). In following tables the results both for FE and RE models will be presented.

One issue that has been mentioned by several authors in relevant literature is the non-random selection of FDI recipients (Smarzynska 2002: 11; Arnold 2003: 2; Damijan *et al.* 2003, Djankov, Murrell 2002). In case the most productive local firms receive FDI, unless the author tries to account for this matter, one might overestimate positive

productivity related effects of FDI. To take account for this possibility, in addition to usual methods of econometrics of panel data, the author also tries to use a two-step sample selection correction procedure. In our econometric estimations program Stata is used.

After estimating the usual RE and FE models, the econometric analysis continues with the Heckman type 2-step procedure in order to control for possible sample selection bias (also called Heckman model, see e.g. Smarzynska 2002):

1) Probit model is estimated, dependent variable is dummy variable $DUMF_{ijt}$ for foreign investment enterprise (=1 if firm has foreign capital, =0 if domestic firm), independent variables, that might affect the choice of the foreign investor to invest or not to invest into the firm are: labour productivity, export orientation, skill intensity (labour costs per employee), fixed assets per employee (as a proxy for K/L ratio). After estimation of this first stage, the inverse of Mill's ratio (also called nonhazard ratio) is calculated and included as a separate variable in the second stage estimation in the regression function;

2) Random effects model is estimated (according to the general form presented before, with the inverse of Mill's ratio as an additional variable).

Or differently – two-stage sample selection correction model (Heckman 2-step procedure):

1) *Prob(FDI)=f(labour productivity, export orientation, skill intensity, K/L ratio)*; linear predictions from the model are obtained and inverse of Mill's ratio is calculated (see annex no 6);

2) Labour productivity=h(FDI, Spillovers, annual, sector dummies, K/L ratio etc).

Inverse of Mill's ratio is given by:

(11) $IMR=f(x)/(1-F(x))$;

where $f(x)$ is the probability density function and $F(x)$ is the cumulative density function (STATA FAQ).

The variables in probit model of estimating the probability of receiving FDI (needed in order to calculate inverse of Mill's ratio and estimate Heckman type two-step procedure) are as follows:

$DUMF_{ijt}$ – FDI dummy variable (as a dependent variable), in case of Estonia $DUMM_{ijt}$ – the majority FDI dummy variable;

$PROD_{ijt}$ – level of labour productivity;

$EXPSALES_{ijt}$ – share of exports in sales of a firm;

$LABC_{ijt}$ – labour costs per employee of a firm;

$FAPEREMP_{ijt}$ – fixed assets per employee (measures K/L ratio);

$TFAPEREMP_{ijt}$ – tangible fixed assets per employee (an alternative measure for K/L ratio).

There would exist a caveat of estimation of the model as specified in (9) if the variable FDI_sector_{ijt} were defined as simply the ratio of sum of FIE assets to sum of total assets instead of the definition used in this research paper. In that arguably inferior case, there might be difficulties in separating the "own-firm" and spillover effects wholly from each other. Especially this would be a problem for these sectors with small number of firms and one or a small number of FIEs making up large proportion of the sector or 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 9 and 10) 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. What have thus improved the results, by establishing a more clear difference between the „own-firm" and spillover effects in the analysis.

3.4. Estimation results

The estimation results for FE and RE model (with and without correction for sample selection bias) are given in tables 15 -18 for Estonia and Slovenia. The model selection

procedure looks like the following, the choice is made based on the F-test, Breusch-Pagan LM test and Hausman test:

1) pooled LS vs FE: F-test;
2) pooled LS vs RE: LM test;
3) FE vs RE model: Hausman test.

The following test statistics are given for the model as specified in tables 15 and 16. 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 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 RE model. These results show again that there exists 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 χ=65.42 (p=0.000); b) for Slovenia χ=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, that 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, both models are presented as they make use of different amount of information in data, thus both could be of interest. The results of the Heckman type two-step procedure for accounting for the sample selection bias are given here too (tables 17 and 18). Note that the random effects probit over all of the years of the sample is used.

Based on the estimation results, the author finds that in Slovenia foreign equity participation is positively correlated with firm's productivity level ("own firm" effect). The coefficient of the FDI dummy was positive, relatively large and significant. In Estonian model, the coefficient of the FDI majority dummy variable was positive, but after including the export orientation dummy and the interaction dummy between FDI presence in a firm and its export orientation, proved to be positive but non-significant.

Table 15. Slovenia - regression results of the estimated model, the effect of FDI on productivity, 1994 – 2000, RE and FE model, dependent variable is Y_{ijt}, i.e. logarithm of labour productivity ($sales_{ijt}/employees_{ijt}$)

	Slovenia					
	RE model			FE model		
	Coef.	Std.Err.	P>|z|	Coef.	Std.Err.	P>|t|
lntfa	0.1094	0.0065	0.000	0.1042	0.007	0.000
lnlabc	0.561	0.01999	0.000	0.5191	0.0211	0.000
dumf	0.1215	0.0464	0.009	0.0837	0.0496	0.092
dumexp	-0.0195	0.0168	0.246	0.0196	0.0177	0.266
dumexp*dumf	0.1413	0.0405	0.000	0.1839	0.0423	0.000
FDI_sector	0.3375	0.1053	0.001	0.3949	0.1053	0.000
DUMF*FDI_sector	-0.5156	0.1479	0.000	-0.7182	0.1571	0.000
lnmater	0.0694	0.0055	0.000	0.0803	0.0065	0.000
dumint	0.0199	0.011	0.07	0.0261	0.0112	0.02
constant	3.0468	0.1567	0.000	3.1863	0.1586	0.000
Sector dummies	Yes			Dropped		
Year dummies	Yes			Yes		
No. of observations	6780			6780		

Source: author's calculations, based on panel data of Slovenian enterprises 1994 – 2000.

The author tests for the differences in productivity related "own firm effects" between export oriented and domestic market oriented enterprises. For that purpose the coefficients of three variables $DUMF_{ijt}$, $DUMEXP_{ijt}$, $DUMEXP*DUMF_{ijt}$ are studied. In order to find the difference of the productivity of export oriented FIEs from the domestic market 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. The analysis shows that in Slovenia export oriented foreign investment enterprises have significantly higher productivity than local market oriented ones (see table 15).

For Estonia the conclusions look rather different from Slovenia, export orientation together with majority of foreign capital in Estonian firm indicates on average much lower labour productivity level – which is just the opposite to the case of Slovenia (see table 16). This difference shows also the different competitive advantages of these two countries, with Slovenia's advantage being in higher value added, skilled labour and higher productivity related sectors, Estonia attracting FDI more due to lower costs than in investors home country. Thus the estimation results affirm the view based on descriptive statistics from tables 9 and 10.

Table 16. Estonia - regression results of the estimated model, the effect of FDI on productivity, 1996 – 2001, RE and FE model, dependent variable is Y_{ijt}, i.e. logarithm of labour productivity ($sales_{ijt}/employees_{ijt}$)

	Estonia					
	RE model			FE model		
	Coef.	Std.Err.	P>|z|	Coef.	Std.Err.	P>|t|
lntfa	0.0545	0.0091	0.000	0.0371	0.0109	0.001
lnlabc	0.6661	0.0246	0.000	0.6731	0.0297	0.000
dumf	0.0575	0.0587	0.327	0.0128	0.0695	0.854
dumexp	0.06	0.0206	0.004	0.0767	0.0231	0.001
dumexp*dumf	-0.127	0.0474	0.007	-0.1075	0.0559	0.055
FDI_sector	-0.041	0.0687	0.55	0.0026	0.0709	0.971
DUMF*FDI_sector	0.3016	0.0912	0.001	0.3421	0.1058	0.001
lnmater	0.3157	0.0084	0.000	0.2936	0.0099	0.000
dumrd	0.0008	0.0182	0.963	-0.0074	0.0189	0.697
constant	1.0507	0.0976	0.000	1.231	0.1375	0.000
Sector dummies	Yes			Yes		
Year dummies	Yes			Yes		
No. of observations	1915			1915		

Source: author's calculations, based on panel data of Estonian enterprises 1996 – 2001.

This view is also supported by a look at labour cost data from these two countries, see tables 13 or 14. In addition to that, the surveys of the reasons why foreign investors invest in Estonia or Slovenia help to clarify these results (tables 11 and 12). The surveys that also support the findings of these results, are the annual "Foreign investor" survey by Estonian Investment Agency and Tartu University for Estonia and a survey by Dedek and Novak (OECD… 2003: 14) for Slovenia. It should be stressed here again, that in Slovenia only 1.8% of foreign investors emphasise the motive of low cost of labour as investing in Slovenia, however, quality of labour is a motive for 26.9% of the FIEs. The issue of labour costs is among predominant factors affecting initial investment decision into Estonia (Varblane 2001).

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 and Ziazic, 2000).

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

The results for Slovenia were: there exist positive (horizontal, i.e between firms in the same sector) spillovers from FIEs to domestic firms, but negative spillovers from FIEs to other FIEs. I.e. spillovers in the following meaning – that the presence of FIEs in a sector of manufacturing (at Nace 2-digit level) affects the productivity of other enterprises in this sector (both DEs and other FIEs).

The results for Estonia regarding spillovers were again, as in case of "own-firm" effects, different from the results for Slovenia, indeed just the opposite of the results for Slovenia. The spillover effect of FDI penetration in the same sector in Estonian manufacturing was non-significant for domestic enterprises in the same sector, but positive and relatively large significant effects for other FIEs in the same sector were found.

Table 17. The 1st stage of Heckman-type two step procedure for accounting for sample selection bias – the probit model, estimation of the probability of receiving FDI, random effects probit (dependent variable: FDI dummy)

	Probit model					
	Slovenia			Estonia		
	$DUMF_{ijt}$			$DUMM_{ijt}$		
	Coef.	Std.Err.	P>|z|	Coef.	Std.Err.	P>|z|
prod	1.02E-05	3.68E-06	0.005	0.0004	0.0005	0.345
expsales	2.123	0.3029	0.000	2.4442	0.3747	0.000
labc	0.0006	7.56E-05	0.000	0.0239	0.0056	0.000
faperemp	-2.66E-06	5.34E-06	0.619	-	-	-
tfaperemp	-	-	-	0.0006	0.0008	0.463
constant	-7.5757	0.4768	0.000	-5.7691	0.4813	0.000
No. of observations	6810			1949		

Source: author's calculations, based on panel data of Slovenian enterprises 1994 – 2000.

These results stay basically the same for different specifications: for RE and FE models and 2-step procedure (similar to Heckman procedure) used for accounting for possible sample selection bias in data. The author also tried a continuous variable $EXPORTS_{ijt}/SALES_{ijt}$ instead of export orientation dummy, it did not alter these basic conclusions given here in former paragraphs. Also exclusion of a very large electronics manufacturer in Estonia – Elcoteq from the panel and estimating the same models again did not alter the basic qualitative results obtained here (see annex 7).

Table 18. The 2nd stage of Heckman-type two-step procedure for accounting for sample selection bias, the effect of FDI on productivity, RE model incl. inverse of Mill's ratio, dependent variable is Y_{ijt}, i.e. logarithm of labour productivity ($sales_{ijt}/employees_{ijt}$)

	Slovenia, RE model			Estonia, RE model		
	Coef.	Std.Err.	P>|z|	Coef.	Std.Err.	P>|z|
lntfa	0.1093	0.0065	0.000	0.0546	0.0091	0.000
lnlabc	0.5502	0.0203	0.000	0.6668	0.0252	0.000
dumf	0.1169	0.0463	0.012	0.0574	0.0587	0.329
dumexp	-0.0191	0.0168	0.253	0.0602	0.0207	0.004
dumexp*dumf	0.1375	0.0405	0.001	-0.1267	0.0475	0.008
FDI_sector	0.3389	0.1052	0.001	-0.0414	0.0687	0.547
DUMF*FDI_sector	-0.4917	0.148	0.001	0.3017	0.0912	0.001
lnmater	0.0698	0.0055	0.000	0.3158	0.0084	0.000
dumint	0.0191	0.011	0.082	-	-	-
dumrd	-	-	-	0.0008	0.0183	0.964
mills	0.0017	0.0006	0.002	-0.0033	0.0238	0.889
constant	3.1188	0.1583	0.000	1.0485	0.0986	0.000
Sector dummies	Yes			Yes		
Year dummies	Yes			Yes		
No. of observations	6780			1915		

Source: author's calculations, based on panel data of Slovenian enterprises 1994–2000.

One consideration that had to be studied more carefully was year 2000 (the last year in the sample) for Slovenia. Year 2000 looks rather "strange" in Slovenian manufacturing, as there is a very big increase in productivity with respect to the year before. This could possibly have been due to some large M&A or measurement error. It proved to be possible to isolate the firms that caused this "leap" in productivity in this year, after excluding these four firms from the sample, the estimation of the model was performed again (both RE, FE and sample selection 2-step procedure). The exclusion of these firms affected the values of coefficients in regression analysis to a small extent, but the qualitative interpretation of the results stayed basically the same as with these firms included. This big "leap" in labour productivity levels was peculiar to only one type of

enterprises in Slovenian panel – the domestic market oriented FIEs. One reason for these big changes in case of Slovenia for year 2000 and the effects of including or excluding a large enterprise as Elcoteq in case of Estonia on average descriptive statistics of enterprises as in table 9, is that both countries are small economies, where one big foreign direct investment can affect the average characteristics of firms and sectors to a significant extent. With regard to recent years, the sales of the pharmaceutical producer Lek (owned by Novartis) in Slovenia has been mentioned, this will without doubt have its effects on the average characteristics of firms. One large investment in the manufacturing sector of Estonia that will affect the analysis (however not in our panel, as it is only up to year 2001) of the productivity differentials between different types of firms in future is Galvex Estonia OÜ. This has been an investment by US individuals who have set up this metal galvanisation plant in Muuga Harbour. Another example, from the wood sector of Estonia, would be the acquisition of AS Sylvester by a multinational Stora Enso.

One policy implication of the analysis of this paper is, that promoting exclusively export oriented FDI is not a useful strategy for all transition economies. Especially in the case of Estonia, concentrating predominantly on promoting export oriented FDI and leaving domestic market oriented FDI (that has much higher average productivity levels in firms) aside, could cause adverse effects for the development of the economy.

3.5. Suggestions for future research

After obtaining the results of econometric analysis, it would be also interesting to discuss the possible further developments of this research field, what could be done and what (data, methods etc) might be needed for that. Additional issues that could be studied, could be at best summarised in the following 6 subjects:

1. The role and effects of transfer pricing in estimating the effects of FDI on productivity.
2. Reverse spillovers.
3. The role of absorptive capacities (skills) of local firms in benefiting from FDI spillovers.
4. Inter-industry (vertical) spillovers.

5. Different types of FDI having different spillover effects.
6. The role of the age of the FDI project.

Let us start from the last issue on this list – the age of the FDI project or more generally, the age of the firm. As theoretical analysis from chapter 1 indicated, the age of the firm (FIE or DE) might affect its productivity level, as according to Schumpeter (see chapter 1 for more) the young firms are possibly the main innovator firms. Related to this issue is another idea, that we could estimate our model of studying FDI effects on productivity also, not on all of the sample, but only on leader firms (e.g. those that have above average or median productivity or profitability or innovations), this could possibly give us some additional information regarding FDI „own-firm" effects and spillovers.

We have so far in this paper studied the „own-firm" effects according to the type of firm/the type of FDI (export or local market oriented). This analysis could be widened to capture also the different spillover effects of different FDI, as export oriented FDI might have different spillovers from domestic market oriented FDI. Whereas export oriented firms do not compete for local market with local firms, the adverse competition effects can be more scarce and thus spillovers more likely to be positive for export oriented FIEs. However, as we have already seen in our analysis, the type of activity transferred to host country may matter for the extent of positive/ negative spillovers. For example, there simply is much more to learn (by imitation etc) for the local firms from e.g. a R&D centre of an MNE than from just another assembly plant of a MNE.

Our framework of analysis can be relatively easily widened to take account for inter-industry spillovers. For Estonia and Slovenia Damijan *et al.* (2003) have similarly to Smarzynska (2002) for Lithuania studied also the vertical spillovers to upstream and downstream enterprises, they however studied total factor productivity and not labour productivity. In order to study vertical spillover, additional data in form of input-output matrices are needed, also import data on firm level would be useful. For Estonia and Slovenia there exist input-output matrices (still not for every year, or not even for every second year) for manufacturing industries, that can be obtained in case of Estonia from Statistical Office of Estonia.

In addition, in econometric analysis, the Olley – Pakes approach might be used in order to take better account for sample selection selection bias, firm entry and endogeneity of inputs (Olley, Pakes 1996).

It is also possible to delve into the question whether the extent of FDI productivity related spillovers depend on the absorptive capacity or innovative activities of local firms. For example we could split the sample into above and below the median/average innovator firms and run the regression as in (9) in both cases. Then there is also the "new" issue of spillovers running in both ways, reverse spillovers or mutual spillovers, i.e from DE to FIE. This is quite a new field of study, an example of this theme is the study by Driffield and Love in 2003.

The issues of effects of FDI on productivity and transfer pricing have never been merged so far, we have argued that transfer pricing might to some extent affect the "own-firm" effect of FDI. For further empirical study of this issue, a lot of additional data is needed – including firm level tax data on home and host country of the investment.

So far no measures of competition have been included among the independent variables in the estimation of the model (9). For an open small economy Herfindahl index would probably not be the best measure of competition, as imports would not be taken account for. Also there is not too much sense in calculating the H-index based on our panel datasets, as these panels do not cover all the enterprises in a sector. Some sort of openness index on sector level could be useful measure to add into the estimation equation, e.g. exports plus imports of a sector as a ratio to the output of the sector. Here in this research paper, also the effects of innovative activities on firm performance are stressed. However estimating the effect of innovative activities of the FIEs on the productivity of the DEs would be a kind of "indirect route" to study. More beneficial would be probably to investigate directly to what extent the innovative activities of the FIEs affect the innovative activities of the DEs (i.e. one might use a new dependent variable and new independent variables that would measure innovative activities of a firm). It can be seen that there is an abundance of possibilities to develop the study of spillovers and "own-firm" effects of FDI (on productivity and other variables) further. These issues are very far from being completely studied.

SUMMARY

FDI can be an important source for productivity growth and swifter transformation process in transition countries, thus also a promoter of economic development in these host countries. Many authors, who have discussed this subject (e.g. R. Caves, A. Kokko, M. Blomström, M. Knell, H. Görg, B. Smarzynska), stress, that foreign direct investments can cause both positive and negative spillover effects to the local economy. Our analysis (descriptive statistics and various methods of analysis of panel data) based on Slovenia and Estonia show, that the growing tendency of the governments in Central and Eastern Europe to offer special incentives for FDI has relatively weak grounds. Justification (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 parent company to its local affiliate and related (positive) spillover effects to the host country. Empirical literature (see e.g. Aitken and Harrison on Venezuela, Görg on United Kingdom, Smarzynska on Lithuania) on the other hand shows so far, along with this study, that there is little conclusive evidence to support this view. It is interesting to study these FDI spillover effects in case of two countries - Estonia and Slovenia - that have rather different stages of development, i.e. also the effects of FDI may be substantially different as well. In case we consider GDP per capita or e.g. the investment development path theory by John Dunning, we can conclude that Slovenia is ahead, already in later stages of development than Estonia. This indeed has as this study indicates, different consequences for productivity related FDI effects, in case we employ also the export/local market dimension of the firms in analysis.

The most important ideas from the analysis of theoretical foundations of productivity, presented in this paper, are the following. One can see from the discussion presented in chapter 1 of this research paper, that productivity really matters for the development and

welfare issues. Small differences in productivity growth are compounded over years to large differences in the standard of living. Productivity is very closely related to the notions such as efficiency, innovations, technological change and competitiveness. It is useful to employ the Schumpeterian / endogenous growth theory approach in productivity analysis, that stresses the importance of innovations (which are simply setting up of a new production function) and human capital, as opposed to the explanation of growth by mainly capital accumulation. What matters a lot for growth are not only inputs as physical capital (and capital deepening), labour, materials and land; but also knowledge. In this research paper, the author has centred his analysis on labour productivity as measured by sales per employee or value added per employee. The theoretical ideas of J. Schumpeter, show that for development purposes new firms are important, as they are likely to be the leaders in innovations, while the old ones display conservatism and rigidity in adopting the new. The parallel that can be made here, although it may seem somewhat artificial at first glance, is with FIEs and DEs, as FIEs are often indeed in some sense "new" firms in the host country and might bring knew knowledge/technologies along, that could raise the productivity levels in the host country.

The second part of this paper delved into the analysis of these potentially positive - but also possibly negative - effects of FDI on productivity in its host country. The theory tells us that the "own-firm" effects of FDI, i.e. on its own affiliate's level of productivity, are predominantly positive as the MNE possibly transfers new technologies and know-how to its affiliate. The discussion in this paper indicates, that there are however also some conditions under which this effect can be also negative, among them also the types of activities that are transferred to the affiliate matter. In case no higher value- adding activities, like e.g. R&D, but only low-value added (assembly) activities are transferred due to e.g. low labour costs, the positive effects are much smaller (or sometimes effects are even negative). The spillover effects from the presence of FDI in a host country occur due to the fact that MNEs cannot wholly internalise the full value of the benefits (or costs) associated with their presence in the host country, some of it is likely to "spill over" to domestic enterprises and other FIEs. The spillovers may be intra-industry as well as inter-industry ones. In this thesis, the emphasis has been put not on the vertical spillovers (inter-industry spillovers), but the

intra-industry ones, i.e. in the same sector of manufacturing (sectors are defined on Nace 2-digit level). The author has included the description of various possible channels for productivity spillovers to occur, differences with this respect between vertical and horizontal spillovers are discussed. We also conclude, that, the economists are less likely to find intra-industry than inter-industry spillovers in empirical analysis, as the MNEs have incentive to hinder the former and promote the latter. The general conclusion regarding spillovers is that they can be both negative (in case negative competition effects dominate) and positive. The reasons for spillovers to occur, and mechanisms by which they take place are still far from being clear for economists.

It is clear, that "own-firm" and spillover effects of FDI have substantial theoretical background. In former papers, studying similar issues for Estonia and Slovenia, these effects have been estimated based on total factor productivity and without implementing export/local market dimension (by Damijan, Knell *et al.* 2003). The aim of this research was to find out the effects of FDI (both "own firm" effects and horizontal spillover effects) on labour productivity in Estonia and Slovenia, based on firm-level panel data of manufacturing industry from the 2nd part of 1990s to year 2001. Also the non-random selection of FDI recipient firms has been taken into account, in addition to usual estimation methods for panel data – random effects and fixed effects models – the author estimated also a two step (Heckman type) sample selection correction procedure. The novelty of this research paper is also adding the export/local market orientation dimension to the analysis (this viewpoint has usually been discarded in empirical literature).

In empirical analysis, the author distinguished between four types of enterprises: domestic market oriented DEs; foreign market oriented DEs; domestic market oriented FIEs; foreign market oriented FIEs. The results of considering both descriptive statistics of panel datasets and econometric estimation results yield significantly different results for Estonia and Slovenia. To a large extent these differences can be explained by different development levels and motivating factors of Estonia and Slovenia for foreign investors. Slovenia has attracted FDI (in case labour related issues are studied) mainly due to labour quality, Estonia however due to labour costs. These differences have also been reflected in average wages of manufacturing in these two transition countries.

Studying the productivity level differences in these named 4 types of firms, indicates also that, as Estonia and Slovenia are small countries, that inclusion/exclusion of some big firms (in case of Estonia – Elcoteq) affects the results significantly.

Based on econometric estimation results, the author showed, that in Slovenia foreign equity participation is positively correlated with firm's productivity level ("own firm" effect). The coefficient of variable indicating FDI presence at firm level was positive, relatively large and significant. In Estonia, the coefficient of FDI majority dummy variable was positive, still after including export orientation dummy and interaction dummy between FDI presence in firm and export orientation in the estimation, it proved to be positive but non-significant.

The differences in productivity related "own firm effects" between export oriented and domestic market oriented enterprises were studied. The results indicate, that in Slovenia the export oriented foreign investment enterprises have significantly higher productivity than local market oriented ones.

For Estonia the conclusions look very different from Slovenia, export orientation together with majority of foreign capital in Estonian firm indicates on average much lower labour productivity level. This is the opposite to the case of Slovenia. This difference shows also the different competitive advantages of these two countries, with Slovenia's advantage being in higher value added, skilled labour and higher productivity related sectors, Estonia attracting FDI more due to lower costs than in investors home country. This view is also supported by a look at labour cost data and investor motivation survey data from these two countries.

The author then tested for intra-industry (horizontal) spillovers from foreign affiliates to firms with no FDI (domestic enterprises) and to other foreign affiliates. Based on the theory, predominantly positive effects were expected.

The results for Slovenia for the period 1994–2000 are the following: there exist positive horizontal spillovers from FIEs to domestic firms, but negative spillovers from FIEs to other FIEs in the same sector in Slovenia.

The results for Estonia regarding spillovers were again, as in case of "own-firm" effects, significantly different from the results for Slovenia, indeed just the opposite of the Slovenian case. The intra-industry spillover effect of FDI presence in Estonian manufacturing was non-significant for domestic enterprises in the same sector, positive and relatively large significant effects were found for other FIEs in the same sector. The results stay basically the same for different specifications: for RE and FE models and 2-step procedure (Heckman type procedure) used for accounting for possible sample selection bias in data, also in case some of the largest enterprises are excluded from the sample used in estimating the coefficient of the model. The author also tried continuous variable $EXPORTS_{ijt}/SALES_{ijt}$ instead of export orientation dummy variable, it did not alter these basic conclusions given here in former paragraphs.

Policy literature of FDI often stresses also that the host countries might benefit from targeting specifically export oriented FDI, assuming it to be more beneficial for the host economy. Our analysis has shown, that this view has potential dangers. E.g. in case of Estonia, concentrating predominantly on attracting export-oriented FDI and leaving domestic market oriented FDI (that has much higher average productivity levels in firms) aside, could cause adverse effects for the development of the economy. One policy implication of the analysis of this paper is, that promoting (and providing incentives) especially export oriented FDI is not among the best FDI promotion strategies for all transition economies.

LITERATURE

1. **Aghion, P. Howitt, P.** A model of Growth Through Creative Destruction. – Econometrica, 1992, Vol. 60, No. 2, pp. 323-351.
2. **Aghion, P., Howitt, P.** Endogenous Growth theory. The MIT Press, 1997.
3. **Aitken, B. J., Harrison, A. E.** Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela. - The American Economic Review, 1999, Vol. 89, No 3, pp. 605-618.
4. **Andersen, E. A.** Evolutionary Economics: post-Schumpeterian Contributions. London: Pinter Publishers, 1994, 238 p.
5. **Arnold, J.** Productivity Estimation at the Plant Level. 1st draft. Bocconi University: 2003, 7 p.
6. Balance of payments compilation guide, Washington D.C.: International Monetary Fund, 1995.
7. Balance of Payments Manual. 5th edition. Washington D.C.: International Monetary Fund, 1995, 188 p. [http://www.imf.org/external/np/sta/bop/BOPman.pdf]
8. Balance of Payments of Estonia. Bank of Estonia, 2004. [http://www.eestipank.info]
9. **Baltagi, H. B.** Econometric Analysis of Panel Data. 2nd edition, Chichester: John Wiley & Sons, 2001.
10. **Barro, R. J., Sala-i-Martin, X.** Economic Growth. New York: McGraw-Hill, 1995, 539 p.
11. **Bernard, A. B., Jensen, J. B.** Exceptional exporter performance: Cause, effect or both? -Journal of International Economics, 1999, Vol. 47, pp. 1-25.
12. **Blomström, M., Kokko, A.** Human Capital and Inward FDI. – SSE Working paper series, 2003, WP No 167, 25 p.
13. **Blomström, M.**, **Kokko, A.** The Impact of Foreign Investment on Host Countries: A Review of the empirical Evidence. Stockholm School of Economics, 1996, 44 p.
14. Candidate Countries Labour Productivity and remuneration levels just over 40% of EU average. – Eurostat news release, No 55/2001, 22 May 2001.

[http://europa.eu.int/comm/eurostat/Public/datashop/print_product/EN?catalogue=Eurostat&product=2-22052001-EN-APEN&mode=download].

15. **Caves, R.** Multinational Enterprise and Economic Analysis, 2nd Ed. Cambridge: Cambridge Surveys of Economic Literature, Cambridge University Press, 1996.
16. **Caves, Richard E.** 1974. "Multinational Firms, Competition and Productivity in Host-Country Markets," Economica, 41(162): 176-93.
17. **Chudnovsky, D., López, A., Rossi, G.** Foreign direct investment spillovers and the absorptive capabilities of domestic firms in the Argentine manufacturing sector in the 90s. Paper prepared for the 1st GLOBELICS conference, Rio de Janeiro, 2003, 27 p.
18. **Criscuolo, C., Haskel, J.** Innovations and Productivity Growth in the UK, evidence from CIS2 and CIS3. UCL, paper prepared for CeRiBA Discussion Paper, 2003, 51 p.
19. **Damijan, J. P., Majcen, B., Knell, M., Rojec, M.** Technology transfer through FDI in Top-10 transition countries: How important are direct effects, horizontal and vertical spillovers? University of Ljubljana, Working paper No. 17, IER, 2003, 29 p.
20. **Damijan, J. P., Majcen, B., Knell, M., Rojec, M.** The Role of FDI, Absorptive Capacity and Trade in Transferring Technology to Transition Countries: Evidence from Firm Panel Data for Eight Transition Countries, mimeo, UN Economic Commission for Europe, Geneva, 2001
21. **Delgado, M.A., Farinas, J.C., Ruano, S.** Firm productivity and export markets: A non-parametric approach. –Journal of International Economics, 2001, Vol. 57, pp. 397-422.
22. **Djankov, S., Hoekman, B.** Foreign Investment and Productivity Growth in Czech Enterprises, World Bank Economic Review, 2000, Vol. 14, No. 1, pp. 49-64.
23. **Djankov S., Murrell, P.** Enterprise Restructuring in Transition: A Quantitative Survey – Journal of Economic Literature, 2002, Vol. 9, pp. 739-791.
24. **Dluhosch, B., Freytag, A., Kroger, M.** International competitiveness and the balance of payments: Do current account deficits and surplus matter? Cheltenham, U.K.: Elgar, 1996, 235 p.

25. **Driffield, N., Love, J**. Foreign Direct Investment, Technology Sourcing and Reverse Spillovers. The Mancester School, Vol. 71, 2003, pp. 659-672.
26. **Dunning, J. H.** The Eclectic Paradigm as an Envelope for Economic and Business Theories of MNE Activity, International Business Review, 2000, Vol. 9, No. 2, pp. 163-190.
27. **Dunning, J. H.** The Eclectic Paradigm of International Production: a Restatement and Some Possible Extensions. – Journal of International Business Studies, 1988, Vol. 19, No. 1, pp. 1 - 31.
28. **Epstein, P.** Measuring the Performance of Public Services. – Public Productivity Handbook (ed. Holzler, M). New York: Marcel Dekker Inc. 1992.
29. Estonian Manufacturing Industry 1995–2001. Tallinn: ESO, 2004, enterprise level database.
30. Estonian Manufacturing Industry 2000–2001. Tallinn: ESO, 2004, sector level database.
31. **Fagerberg, J.** A Layman's Guide to Evolutionary Economics. Mimeo, 2002, 50 p. [http://folk.uio.no/janf/downloadp/02fagerberg_evolution.pdf]
32. Foreign Direct Investment in Slovenia – Trends and Prospects. – OECD Investment Policy Reviews: Slovenia. OECD: 2002, 35 p.
33. Foreign Direct Investment Statistics: How Countries Measure FDI 2001. Washington D.C.: IMF, OECD, 2003, 159 p.
34. **Gates, S., Stone, A.** Understanding Productivity In Higher Education. – RAND, 1997, 47 p. [http://www.ucop.edu/acadinit/mastplan/ProjectH.pdf]
35. **Gestrin, M.** Is Export-oriented FDI better?- OECD Global Forum on International Investment- New Horizons and Policy Challenges for Foreign Direct Investments in the 21st Century. Mexico, 2001, pp. 1-9.
36. **Greene, W. H.** 1993. Econometric Analysis, 2nd edition. New Jersey: Prentice-Hall International.
37. **Greenaway, D.**, Sousa, N., Wakelin, K. Do Domestic Firms Learn to Export from Multinationals? 2002
38. **Griliches, Z.** Productivity Puzzles and R&D: Another Non-explanation. –The Journal of Economic Perspectives, 1988, Vol. 2, No. 4, pp. 9-21.

39. **Griliches, Z., Mairesse, J.** Production Functions: the Search for Identification. NBER Working Paper 5067, 1995.
40. **Gust, C., Marquez, J.** International comparisons of Productivity Growth: Recent Developments. – Business Economics, July 2001, pp. 55-62.
41. **Görg, H., Greenaway, D.** Foreign Direct Investment and Intra- Industry Spillovers: A Review of the Literature. GEP Research paper 2001/37; 2001
42. **Görg, H., Greenaway, D.** Much Ado About Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment? - Nottingham, Leverhulme Centre for Research on Globalisation and Economic Policy, 2002, mimeo, 31 p.
43. **Görg, H., Strobl, E.** 2001. Multinational Companies and Productivity Spillovers: A Meta-Analysis. The Economic Journal, 111, 2001, pp. 723-39.
44. **Hannula, H., Tamm, K.** Restructuring and efficiency in the Estonian manufacturing industry: the role of foreign ownership. – Working paper series of Tartu University, Faculty of Economics and Business Administration, No 15, 2003.
45. **Harris, R., Robinson, C.** Foreign Ownership and Productivity in the United Kingdom, Estimates for UK Manufacturing Using the ARD. 2001, 34 p.
46. **Hsiao, C.** Analysis of Panel Data. Cambridge: Cambridge University Press, 1999, 246 p.
47. Index of Economic Freedom 2003. The Heritage Foundation, The Wall Street Journal, 2003, 422 p.
48. **Jaklič, A., Svetličič, M.** Enhanced Transition Through Outward Internationalization: Outward FDI by Slovenian firms. Aldershot: Ashgate, 2003, 344 p.
49. **Jorgenson, D.W.** Productivity I. Cambridge, MA: MIT Press, 1995, 434 p.
50. **Jorgenson, D.W.** Productivity II. Cambridge, MA: MIT Press, 1995, 470 p.
51. **Kinoshita, Y.** R&D and technology spillovers via FDI: Innovation and absorptive capacity. CERGE-EI, CEPR and WDI working paper, November 2000, 2000, 24 p.
52. **Kokko, A.** Globalization and FDI policies. – The Development Dimension of FDI: Policy and Rule-making Perspectives. UNCTAD, New York and Geneva: 2003, pp. 29-40.

53. **Kokko, A., Tansini, R., Zejan, M.** Local Technological Capability and Productivity Spillovers from FDI in the Uruguayan Manufacturing Sector. - Journal of Development Studies, 1996, Vol 8. 32(4): 602-620.
54. **Krugman, P**. The Age of Diminishing Expectations. 1st edition. MIT press, 1990.
55. **Krugman, P.** Making Sense of the Competitiveness Debate. International Competitiveness. Oxford Review of Economic Policy, Autumn 1996, Vol. 12, No. 3, pp. 17-25.
56. **Kurik, S., Lumiste, R., Terk, E., Heinlo, A.** Innovatiivne tegevus Eesti ettevõtetes1998–2000, Tallinn: EAS 2002, 100 p.
57. **Larrain F.B., Lopez-Calva L., Rodriguez-Clare A.** Intel: A Case of FDI in Central America. - CID Working Paper, No. 58, 2000, 40 p.
58. **Liu, X., Wei, Y.** Mutual productivity spillovers between foreign and local firms in China. - Aston Business School Research Paper, 2003, No.0307, 10 p.
59. **Magnusson, L.** Evolutionary and Neo-Schumpeterian Approaches to Economics. Boston: Kluwer Academic Publishers, 1994, 326 p.
60. **McFertridge, D. G.** Competitiveness: Concepts and Measures. Occasional Paper Number 5, April 1995, 39 p.
61. **Mereste, U.** Kompleksanalüüs ja efektiivsus. Tallinn: Valgus, 1984, 364 p.
62. **Männik, K.** Tootlikkus. University of Tartu, Faculty of Economics and Business Administration, 2002, 15 p. (manuscript)
63. **März, E.** Joseph Schumpeter: scholar, teacher and politician. London: Yale University Press, 1991, 204 p.
64. OECD Benchmark Definition of Foreign Direct Investment. 3rd edition. OECD, Paris, 1996, 56 p. [http://www.oecd.org/dataoecd/10/16/2090148.pdf]
65. OECD Productivity Manual – A Guide to the Measurement Of Industry-level and Aggregate Productivity. OECD, Paris, 2001, 149 p.
66. **Okamoto, Y.** Multinationals, Production Efficiency and Spillover Effects: The Case of the U.S. Auto Parts Industry. Weltwirtschaftliches Archiv, Vol.135, No.2., pp.241-260.
67. **Olley, S. G., Pakes, A.** The Dynamics of Productivity in the Telecommunications Equipment Industry, Econometrica 64(6), 1996, pp. 1263-1297.

68. **Oulton, N.** Labour Productivity and Foreign Ownership in the UK, NIESR Discussion Paper no. 143, 1998.
69. **Oulton, N.** Why do foreign-owned firms in the UK have higher labour productivity? -Inward investment, technological change and growth. Bank of England, 2000, pp. 122-160.
70. **Pain, N.** Inward Investment, Knowledge Transfers and Productivity: What does the UK evidence reveal? - The Role of Efficiency as an Explanation of International Income Differences, NIESR Conference 2002, 2002, 27 p.
71. **Porter, M.** The Competitive Advantage of Nations. The Free Press. New York: A Division of MacMillan, 1998, 855 p.
72. **Rojec, M., Svetličič, M.** Facilitating Transition by Internationalization: Outward Direct investment from Central European Economies in Transition. Aldershot: Ashgate, 2003, 273 p.
73. **Romer, D.** Advanced macroeconomics. Boston: McGraw-Hill, 2001, 651 p.
74. **Ruiz, I.** Innovation and Technology: The Creative Destruction Analysis of a Model of Endogenous Growth (Schumpeterian Approach). Western Michigan University, Department of Economics, mimeo, 2003, 12 p.
75. **Ruttan, V.W.** Usher and Schumpeter on Invention, Innovation and Technological Change. Quarterly Journal of Economics, vol. 73, Nov 1959.
76. **Schreyer, P., Pilat, D.** Measuring Productivity. – OECD Economic Studies, 2001, No. 33, pp. 127-169.
77. **Schumpeter, J. A.** Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process. New York: McGraw-Hill, 1939.
78. **Schumpeter, J. A.** Capitalism, Socialism and Democracy. New York: Harper & Row, 1975 (1st ed. in 1942) .
79. **Sgard, J.** Direct Foreign Investments and Productivity Growth in Hungarian Firms, 1992-1999, CEPII WP, Working paper no 19, 2001, 35 p.
80. **Sharpe, A.** Productivity Concepts and Trends. – The Review of Economic Performance and Social Progress 2002: Towards a Social Understanding of Productivity. Centre for the Study of Living Standards, 2002, pp. 31-56. [http://www.csls.ca/repsp/2/andrewsharpe.pdf]

81. Slovenian Manufacturing Industry 1994-2000. Ljubljana: Statistical Office of Slovenia, 2002, enterprise level database.
82. Slovenia – Your Business Partner 2003-2004. Ljubljana: TIPO, 2004, 25 p.
83. **Smarzynska, B.** Spillovers from Foreign Direct Investment through Backward Linkages: Does Technology Gap Matter? Mimeo, World Bank, 2001.
84. **Solow, R. M.** Technical Change and the Aggregate Production Function. Review of Economics and Statistics, 39, 1957, pp. 312-320.
85. Stata FAQ – How can I get the Mills' ratios for my Heckman model. [http://www.stata.com/support/faqs/stat/mills.html]
86. **Talavera, O.** The Effect of Foreign Direct Investments on Firm Performance in Ukraine. Kyiv-Mohyla Academy, 2001, 52 p. (thesis for partial fulfilment for the degree of MA)
87. Tööstus, 2002/01. Quarterly bulletin. Statistical Office of Estonia, 2002, No. 1, 48 p.
88. UNCTAD, 2001. World Investment Report 2001. Promoting Linkages. New York and Geneva: United Nations, 2001, 355 p.
89. UNCTAD, 2002. World Investment Report 2002. Transnational Corporations and Export Competitiveness. New York and Geneva: United Nations, 2002, 351 p.
90. UNCTAD, 2003. World Investment Report 2003. FDI Policies for Development: National and International Perspectives. New York and Geneva: United Nations, 2003, 347 p.
91. **Vahter, P.** Välismaiste otseinvesteeringute mõju tööhõivele ning tööjõu tootlikkusele siirderiikides, Eesti ning Sloveenia töötleva tööstuse näitel. TÜ rahvusvahelise ettevõtluse õppetool, 2001, 67 p. (BA thesis)
92. **Vahter, P.** Küsitluse "Välisinvestor 2001" tulemuste analüüs. EAS, 2002, 21 p.
93. **Varblane, U.** Küsitluse "Välisinvestor 2000" tulemuste analüüs. EAS, 2001, 25 p.
94. **Varblane, U., Roolaht, T., Reiljan, E., Jüriado, R.** Estonian Outward Foreign Direct Investments. Working paper series, Tartu University, Faculty of Economics and Business Administration, 2001, 59 p.
95. **Varblane, U., Ziacic, T.** The Impact of Foreign Direct Investment on the Export Activities of Estonian Firms. – Journal of East West Business, Vol. 5 No ½, 1999, pp. 173-190.

96. **Wooldridge, J.** Econometric Analysis of Cross Section and Panel Data. Cambridge, Mass.: MIT Press, 2002, 752 p.

Annex 1

Linkages (backward, forward, horizontal)

Table 19. Linkages (backward, forward, horizontal) and other relationships between foreign affiliates and local enterprises and organisations

Form	Relationship of foreign affiliate to local enterprise			Relationship of foreign affiliate to non-business institution
	Backward	Forward	Horizontal	
"Pure" market transaction	• "Off-the-shelf" purchases	• "Off-the-shelf" sales		
Short-term linkage	• Once-for-all or intermittent purchases (or contract)	• Once-for-all or intermittent sales (or contract)		
Longer-term linkage	• Longer-term (contractual) arrangement for the procurement of inputs for further processing	• Longer-term (contractual) relationship with local distributor or end-customer • Outsourcing from domestic firms to foreign affiliates	• Joint projects with domestic firm	• R&D contracts with local institutions such as universities and research centres • Training programmes for firms by universities • traineeships for students in firms
Equity relationship	• Joint venture with supplier • establishment of new supplier-affiliate (by existing foreign affiliate)	• Joint venture with distributor or end-customer • Establishment of new distribution affiliate (by existing foreign affiliate)	• Horizontal joint venture • Establishment of new affiliate (by existing foreign affiliate) for the production of same goods and services as it produces	• Joint public-private R&D centres/training centres / universities
"Spillover"	• Demonstration effects in unrelated firms - Spillover on processes (incl. technology) - Spillover on product design - Spillover on formal and on tacit skills (shopfloor and managerial) Introduction of dominant design/standard by MNE (results in both demonstration and competition effects) • Effects due to mobility of trained human resources • Ednterprise spin-offs • Competition effects • Cluster creation effects			

Source: UNCTAD 2001: 131, with minor donations of the author.

Annex 2

Empirical papers on productivity spillovers

Table 20. Papers on productivity spillovers, authors, countries, data, aggregation level, results

	AUTHOR / S	COUNTRIES	YEAR/S	DATA	AGGREGATION	RESULTS
	a) Developed Countries					
1	Caves (1974)	Australia	1966	Cross-Sectional	Sector	+
2	Globerman (1979)	Canada	1962	Cross-Sectional	Sector	+
3	Barrios (2000)	Spain	1990-94	Panel	Firms	Mixed
4	Girma, Greenaway and Wakelin (2000)	United Kingdom	1991-96	Panel	Firms	Mixed
5	Girma and Wakelin (2000)	United Kingdom	1988-96	Panel	Firms	?
6	Liu, Siler, Wang and Wei (2000)	United Kingdom	1991-95	Panel	Industry	+
7	Braconier, Ekholm and Knarvik (2001)	Sweden	1978-94	Panel	Firms	?
8	Castellani and Zanfei (2001)	France, Italy and Spain	1993-97	Panel	Firms	+
9	Driffield (2001)	United Kingdom	1989-92	Cross-Sectional	Industry	+
10	Girma and Wakelin (2001)	United Kingdom	1980-92	Panel	Firms	?
11	Harris and Robinson	United Kingdom	1974-95	Panel	Firms	?
12	Barrios, Dimelis, Louri and Strobl (2002)	Greece, Ireland and Spain	1993-97	Panel	Firms	? +
13	Barrios and Strobl (2002)	Spain	1990-94	Panel	Firms	?
14	Castellani and Zanfei (2002)	Italia	1992	Panel	Firms	+
15	Dimelis and Louri (2002)	Greece	1997	Cross-Sectional	Firms	? +
16	Driffield and Love (2002)	United Kingdom	1984-95	Panel	Firms	Mixed
17	Girma (2002)	United Kingdom	1989-99	Panel	Firms	?
18	Görg and Strobl (2002a)	Ireland	1973-96	Panel	Firms	Mixed
19	Haskel, Pereira and Slaughter (2002)	United Kingdom	1973-92	Panel	Firms	+
20	Ruane and Ugur (2002)	Ireland	1991-98	Panel	Firms	?
21	Keller and Yeaple (2003)	USA	1987-96	Panel	Firms	+
	b) Developing Countries					
22	Blomström and Persson (1983)	Mexico	1970	Cross-Sectional	Sector	+
23	Blomström (1986)	Mexico	1970/75	Cross-Sectional	Sector	+
24	Haddad and Harrison (1993)	Morocco	1985-89	Panel	Firms	-
25	Blomström and Wolff (1994)	Mexico	1970/75	Cross-Sectional	Sector	+
26	Kokko (1994)	Mexico	1970	Cross-Sectional	Sector	? +
27	Kokko (1996)	Mexico	1970	Cross-Sectional	Sector	+

Annex 2 continued

	AUTHOR / S	COUNTRIES	YEAR/S	DATA	AGGREGATION	RESULTS
28	Kokko, Tansini and Zejan (1996)	Uruguay	1988	Cross-Sectional	Firms	?
29	Kinoshita (1999)	China	1990-92	Panel	Firms	?
30	Tansini and Zejan (1998)	Uruguay	1988-90	Cross-Sectional	Firms	+
31	Blomström and Sjöholm (1998)	Indonesia	1991	Cross-Sectional	Firms	+
32	Sjöholm (1999)	Indonesia	1980-91	Cross-Sectional	Firms	+
33	Aitken and Harrison (1999)	Venezuela	1976-89	Panel	Firms	-
34	Chuang and Lin (1999)	Taiwan	1991	Cross-Sectional	Firms	+
35	Kathuria (2000)	India	1976-89	Panel	Firms	-
36	Kugler (2000)	Colombia	1974-98	Panel	Firms	? +
37	Patibandla (2000)	India	1989-99	Panel	Firms	? +
38	Kokko, Tansini and Zejan (2001)	Uruguay	1988	Cross-Sectional	Firms	?
	Zhou, Li and Tse	China	1995	Cross_sectional	Firms	+/-
39	Görg and Strobl (2002b)	Ghana	1987-96	Panel	Firms	? +
40	Marin and Bell (2003)	Argentina	1992-96	Panel	Firms	? +
	Chudnovski et al.(2003/2004)	Argentina	1992-1996	Panel	Firms	-
	c) Transition Countries					
41	Djankov and Hoeckman (2000)	Czech Republic	1992-96	Panel	Firms	-
42	Kinoshita (2000)	Czech Republic	1995-98	Panel	Firms	? +
43	Konings (2000)	Bulgaria, Poland and Romania	1993-97	Panel	Firms	-
44	Bosco (2001)	Hungary	1993-97	Panel	Firms	-
45	Damijan and Knell (2001)	Slovenia and Estonia	1995-99	Panel	Firms	+
46	Damijan, Majcen, Knell and Rojec (2001)	Bulgaria, Czech Republic, Estonia,	1994-98	Panel	Firms	? or -, + only
		Hungary, Poland, Romania, Slovakia				for Romania
		and Slovenia				
47	Sgard (2001)	Hungary	1992-99	Panel	Firms	? +
48	Schoors and Van der Tol (2002)	Hungary	1997-98	Cross-Sectional	Firms	Mixed
49	Talavera (2001)	Ukraine	1998-99	Panel	Firms	+ (depends on region)
50	Zukowska-Gagelmann (2002)	Poland	1993-97	Panel	Firms	-
Notes:						
1) Aggregation: Industry or firm level data						
2) ? : Non significant results						
3) Mixed: Positive and negative effects						

Source: Görg, Strobl 2001; Chudnovsky *et al*. 2003, with minor donations of the author

Annex 3

4 types of firms in analysis of the "own-firm" effects of FDI

1) DE, DM (dumf=0, dumexp=0)

2) DE, FM (dumf=0, dumexp=1)

3) FIE, DM (dumf=1, dumexp=0)

4) FIE, FM (dumf=1, dumexp=1)

II dimensions: ownership, market (abroad, local)

DE- domestic enterprise (dumf=0)

FIE – foreign investment enterprise (dumf=1)

DM – domestic market oriented (dumexp=0)

FM – foreign market oriented enterprise (dumexp=1)

Annex 4

Average monthly wages by sub-sector of manufacturing in Slovenia, 2000-2002

Table 21. Average monthly wages by sub-sector of manufacturing in Slovenia, 2000-2002, in EUR

Sector (incl. Nace 2-level code)	2000	2001	2002
Total	763.11	820.01	867.99
15 Manufacture of food products and beverages	838.67	896.86	943.95
17 Manufacture of textiles and textile products	598.51	599.52	680.70
18Manufacture of wearing apparel	512.82	558.38	568.49
19Manufacture of leather and leather products	584.70	635.89	659.67
20 Manufacture of wood and wood products	635.77	674.28	704.57
21Manufacture of pulp, paper and paper products	812.30	890.55	941.44
22Publishing, printing	1063.00	1089.97	1138.15
23 Manufacture of coke, refined petroleum products	858.33	912.87	956.43
24 Manufacture of chemicals, chemical products and man-made fibres	1178.03	1319.13	1384.15
25 Manufacture of rubber and plastic products	770.22	827.06	858.99
26 Manufacture of other non-metallic mineral products	770.81	808.41	849.61
27 Manufacture of basic metals	801.28	852.99	921.99
28 Manufacture of fabricated metal products (except machinery and equipment)	758.07	799.24	850.19
29 Manufacture of machinery and equipment	745.56	802.07	858.57
30 Manufacture of office machinery and computers	920.32	1034.67	1116.42
31 Manufacture of electrical machinery and equipment	777.18	832.67	883.96
32 Manufacture of radio, TV and communication equipment	785.03	846.47	930.82
33 Manufacture of medical, precision and optical instruments, watches	758.26	814.16	853.11
34 Manufacture of motor vehicles, trailers etc.	823.10	874.29	932.46

Annex 4 continued

Sector (incl. Nace 2-level code)	2000	2001	2002
35 Manufacture of other transport equipment	784.34	826.00	872.59
36 Manufacture of furniture, other	630.53	672.95	709.80
37 Recycling	938.36	992.63	1012.10

Source: Statistical Office of Slovenia.

Annex 5

Average monthly wages by sub-sector of manufacturing in Estonia, 2000-2002

Table 22. Average monthly wages by sub-sector of manufacturing in Estonia, 2000-2002, in EUR

Sector (incl. Nace 2-level code)	2000	2001	2002
Total	309.59	341.10	376.06
15-16 Manufacture of food products, beverages and tobacco	306.01	336.75	370.56
17 Manufacture of textiles and textile products	257.63	270.73	297.89
18Manufacture of wearing apparel	239.35	263.70	286.77
19Manufacture of leather and leather products	243.50	261.02	300.51
20 Manufacture of wood and wood products	305.69	350.30	392.48
21Manufacture of paper and paper products	367.04	396.25	433.00
22Publishing, printing	542.23	602.37	654.65
23-24 Manufacture of coke, refined petroleum products, of chemicals, chemical products and man-made fibres	314.25	355.80	384.24
25 Manufacture of rubber and plastic products	302.75	349.85	426.87
26 Manufacture of other non-metallic mineral products	411.34	453.13	504.33
27-28 Manufacture of basic metals, fabricated metal products (except machinery and equipment)	353.18	393.25	415.49
29 Manufacture of machinery and equipment	317.90	355.28	392.67
31 Manufacture of electrical machinery and equipment	392.86	449.49	552.71
32 Manufacture of radio, TV and communication equipment	294.44	301.02	361.36
33 Manufacture of medical, precision and optical instruments, watches	348.83	363.34	392.99
34-35 Transport equipment	369.73	414.34	463.55
36 Manufacture of furniture, Other	280.32	307.42	330.30

Source: Statistical Office of Estonia.

Annex 6

Econometric concerns, sample selection bias

Non-random selection of FDI recipients – most productive local firms receive FDI (Smarzynska 2002; Djankov, Hoekman 2000; Knell, Damijan 2001).

This leads us to use two-stage sample selection bias correction model (Heckman model):

Prob.(FDI)= f(labour productivity, export orientation, skill intensity, K/L ratio), and based on this model calculate the vector of inverse of Mill's ratio;

Labour productivity=h(FDI, Spillovers, annual, sectoral dummies, K/L ratio, other variables on production inputs, inverse of Mill's ratio)

Calculating inverse of Mill's ratio:

1. Calculate the probit model for the participation.
2. Obtain the linear predictors from the model.
   For example (in Stata), predict phat, xb

3. Calculate the Mills' ratios, then the inverse of it, *i.e.lambda=f(x)/F(x)* where *f(x)* is the probability density function and *F(x)* is cumulative density function. For example, *gen mills = exp(-.5*phat2)/(sqrt(2*_pi)*normprob(phat))*. (Stata FAQ)

Annex 7

The FE and RE models for Estonia without Elcoteq

Table 23. Estonia - regression results of the estimated model, the effect of FDI on productivity, 1996 – 2001, RE and FE model without Elcoteq, dependent variable is Y_{ijt}, i.e. logarithm of labour productivity ($sales_{ijt}/employees_{ijt}$)

	Estonia (without Elcoteq)					
	RE model			FE model		
	Coef.	Std.Err.	P>|z|	Coef.	Std.Err.	P>|t|
lntfa	0.0548	0.0091	0.000	0.0375	0.0109	0.001
lnlabc	0.6661	0.0247	0.000	0.6731	0.0297	0.000
dumf	0.0604	0.0588	0.305	0.0162	0.0697	0.816
dumexp	0.0601	0.0206	0.004	0.0767	0.0231	0.001
dumexp*dumf	-0.1274	0.0475	0.007	-0.1082	0.056	0.053
FDI_sector	-0.0423	0.0688	0.539	0.0019	0.071	0.978
DUMF*FDI_sector	0.2944	0.0916	0.001	0.334	0.1064	0.002
lnmater	0.3158	0.0084	0.000	0.2938	0.0099	0.000
dumrd	0.0008	0.0183	0.967	-0.0074	0.019	0.695
constant	1.0501	0.0977	0.000	1.2297	0.1377	0.000
Sector dummies	Yes			Yes		
Year dummies	Yes			Yes		
No. of observations	1909			1909		

Source: author's calculations, based on panel data of Estonian enterprises 1996 – 2001.

KOKKUVÕTE

VÄLISMAISTE OTSEINVESTEERINGUTE MÕJU TOOTLIKKUSELE EESTI JA SLOVEENIA TÖÖTLEVAS TÖÖSTUSES

Priit Vahter

Otsesed välisinvesteeringud (OVI) on omanud olulist rolli siirderiikide majanduse arengus. OVI juurdevool riiki võib aidata kaasa sihtriigi tootlikkustaseme tõusule ning üleminekuriikide puhul soodustada kiiremat siirdeprotsessi. Kesk-ja Ida-Euroopa riikides, nagu ka mujal maailmas, on tunduvalt kasvanud otseselt välisinvestoritele suunatud erinevate soodustuste (subsiidiumite jms) pakkumine nende sihtriikide valitsuste poolt (välja arvatud siiski Eestis ja ka Sloveenias). Ühe peamise põhjendusena sellisele ühe ettevõtete grupi erikohtlemisele on traditsiooniliselt nimetatud tehnoloogiasiiret multinatsionaalsest emaettevõttest kohalikku tütarettevõttesse ning (eriti majanduspoliitilistes kirjutistes) tehnoloogiasiirdega kaasnevaid (positiivseid) välisefekte (i.k. *spillover effects*) teistele ettevõtetele investeeringu sihtriigis.

Samas varasem empiiriline kirjandus antud teema osas (nt Aitken ja Harrison Venetsueela; A. Kokko Uruguay, H. Görg või N. Driffield Suurbritannia osas ning B. Smarzynska Leedu kohta) näitab, et antud järeldusel puudub kindel alus. Üldiselt autorid, kes on antud valdkonda teoreetiliselt ja empiiriliselt uurinud, rõhutavad, et otsesed välisinvesteeringud võivad sihtriigis kaasa tuua nii positiivseid kui negatiivseid välisefekte.

Antud uurimistöö eesmärk on leida, millised on olnud OVI mõjud tööjõu tootlikkusele Eesti ja Sloveenia töötlevas tööstuses. Põhjus, miks valitud on nimelt need kaks väiksemat siirderiiki on see, et nende riikide olulised erinevused võimaldavad lisaks analüüsida OVI "oma ettevõtte" (i.k. *own-firm*) ja välisefektide mõju sõltuvalt sihtriigi majandusarengu tasemest. Nii SKT *per capita* alusel kui ka nt investeeringu arenguraja (Dunning; Narula) teooriat lähtekohaks võttes, ilmneb Sloveenia tunduvalt kõrgem

majanduse arengutase. Sloveenial on Kesk- ja Ida-Euroopa siirderiikidest kõrgeim SKT *per capita* tase, samas näeme, et (sissetuleva) OVI osakaal riigi majanduses on tunduvalt suurem Eesti puhul. Samuti erinevad tunduvalt antud kahe riigi valitsuse poliitika, erastamismeetodid ning välisinvestoreid investeerima motiveerivad tegurid.

Autor uurib töös (paneelandmete regressioonianalüüsi ning suhtarvude analüüsi alusel) esiteks, kuidas mõjutab väliskapitali olemasolu ettevõttes ettevõtte enda tootlikkustaset (nn ”oma ettevõtte” efekt). Järgnevalt analüüsitakse, kas esineb (tööstusharusiseseid) OVI välisefekte väliskapitaliga firmadelt kodumaisel kapitalil põhinevaile tootjaile (lühend KE) ning teistele välismaise otseinvesteeringuga ettevõtetele (VOE). Lisaks vaadeldakse uuendusliku käsitlusena, kas OVI mõjud tootlikkusele sõltuvad OVI tüübist. Täpsemalt - milline on väliskapitaliga ettevõtte puhul ekspordile/kohalikule turule orienteerituse mõõtme mõju, kas leidub erinevusi tootlikkuse tasemes ekspordile orienteeritud ning kohalikule turule orienteeritud VOEde vahel. Seni on pea kõik antud uurimisvaldkonna uurimused keskendunud lihtsalt OVI poolt tootlikkusele avaldatava mõju uurimisele, käsitlemata on jäetud eri tüüpi OVI mõjud, mis võivad olla siiski küllaltki erinevad. Erinevate OVI tüüpide erinev mõju sihtriigi majandusele on oluline temaatika ka sihtriigi majanduspoliitika kujundamise jaoks. Tihti rõhutatakse eelkõige eelistatavalt just ekspordile orienteeritud OVI riiki hankimise olulisust, eeldades seega, et antud tüüpi OVI on sihtriigile kõige kasulikum. Autor analüüsib töös antud vaate sobivust või mittesobivust Eesti ja Sloveenia ning siirderiikide jaoks laiemalt.

Töös toetutakse analüüsil Eesti ning Sloveenia töötleva tööstuse ettevõtete paneelandmetele. Eesti andmed pärinevad Eesti Statistikaametist, Sloveenia andmed Sloveenia Statistikaametist (vahendatuna Ljubljana Ülikooli professori Jože Damijani poolt). Sloveenia paneel koosneb 982 ettevõttest, hõlmab perioodi 1994 – 2000, vaatlusi kokku 6780. Eesti paneel koosneb 326 ettevõttest, hõlmab perioodi 1996 – 2001, kokku vaatlusi seega 1956.

Töö koosneb kolmest osast, neist esimene tegeleb tootlikkuse analüüsi traditsiooniliste ja uuemate lähtekohtade aruteluga, teine OVI poolt tootlikkusele avaldatavate mõjude teoreetilise käsitluse ning empiirilise kirjanduse ülevaatega, kolmandas tuuakse ära autori empiiriline analüüs OVI mõjude kohta tootlikkusele Eestis ja Sloveenia.

Olulisemad järeldused tootlikkuse analüüsi teoreetiliste aluste – toodud töö 1. peatükis - põhjal on järgnevad. Toodud arutelu näitab selgelt tootlikkuse (nii taseme kui kasvu) olulisust heaolu kasvu ja majandusarengu tarvis. Tunnustatud lähtepunktina on analüüsis kasutatud antud valdkonnas J. Schumpeteri / endogeense kasvuteooria käsitlust, mis rõhutab innovatsiooni ja inimkapitali olulisust tootlikkuse kasvu ja majanduskasvu jaoks. Lisanduv olulisem Schumpeteri teooriatele põhinev järeldus on see, et "nooremad" (st uued) ettevõtted omavad olulist rolli majanduse arengus (ja tootlikkuse kasvus). Innovatsioon leiab aset antud käsitluse järgi pigem uutes ettevõtetes kui vanades, paljuski sest vanad ettevõtted on uute ideede suhtes pigem konservatiivsemalt ja tõrjuvamalt häälestatud kui uuemad. Siinkohal võib tuua paralleeli ka VOEde ja kohalikul kapitalil põhinevate ettevõtetega – VOEd on sihtriigi keskkonna jaoks teatavas mõttes "uued" ettevõtted ja võivad seega aidata märkimisväärselt kaasa teadmiste ja tehnoloogiate arendamisele ning tootlikkustasemel kasvule sihtriigis.

Teise peatüki teoreetiliste käsitluste alusel võib järeldada, et OVI nn "oma ettevõtte" efekt tootlikkusele, st mõju oma tütarettevõttele, on pigem positiivne, põhjus eelkõige tehnoloogia- ja teadmiste siire emaettevõttest tütarettevõttesse. Siiski esineb teatud tingimusi mille korral antud efekt võib kujuneda ka negatiivseks, mõju oleneb paljuski OVI tüübist ja OVI sihtriigi-lähteriigi erinevustest. Kui näiteks sihtriiki viiakse üle mitte suuremat lisandväärtust loovaid tegevusi (nagu nt teadus- ja arendustegevus), vaid asutatakse (nt madalate tööjõu- ja muude kulude kaalutlusel) lihtne koostetehas, võivad positiivsed tootlikkusega seotud mõjud – tütarettevõttele ning teistele riigi ettevõtetele - olla väiksemad või koguni negatiivsed. Välisefektid OVI olemasolust tootmisharus tulenevad sellest, et multinatsionaalne ettevõte ei suuda internaliseerida kõiki oma tegevusega seotud tulusid (või ka kulusid), st osad tema tegevusega seotud tulud või kulud kanduvad üle teistele ettevõtetele – nii kodumaisel kapitalil põhinevatele kui ka teistele VOEdele. Välisefektid (ülevooluefektid) võivad olla nii tööstusharu sisesed (i.k. *intra-industry*) kui ka harude vahelised, st suunatud teiste harude ettevõtetele (i.k. *inter-industry*). Antud uurimuses on keskendutud eelkõige tööstusharu siseste välisefektide analüüsile. Autor on välja toonud ka erinevad välisefektide toimimise kanalid ja seejuures vastavad erinevused tööstusharu siseste ning – harude vaheliste (st vertikaalsete) välisefektide vahel. Üheks kirjanduse põhjal tehtud järelduseks on see, et uurimustes on vähem tõenäoline leida tööstusharu siseseid välisefekte kui tööstusharude

vahelisi ülevooluefekte, sest multinatsionaalsete ettevõtete suhtumine neist esimestesse on pigem tõrjuv ja teistesse pigem soosiv. Kokkuvõtvalt võib öelda, et nn "ülevooluefektid" võivad olla nii positiivsed (juhul kui ei domineeri negatiivne konkurentsiefekt) kui negatiivsed. Ülevooluefektide põhjused ja nende toimimise mehhanismid on siiani kaugel sellest, et olla majandusteadlaste jaoks selged ja teada.

Uurimuse empiirilises osas hinnati otseste välisinvesteeringute mõju tööjõu tootlikkusele Eesti ning Sloveenia töötlevas tööstuses. Autor kasutab enamlevinud paneelandmete analüüsi meetodeid (juhusliku efektiga mudel, fikseeritud efektiga mudel) ning lisaks vähem tuntud valimi selektiivsuse probleemi lahendamiseks sobivat Heckmani tüüpi 2-astmelist mudelit. Valimi selektiivsuse probleem tuleneb sellest, et OVI saavad ettevõtted võivad olla samas kõrgema tootlikkusega ettevõtted (sest kõrgema tootlikkusega ettevõtted on atraktiivsemad välisinvestorite jaoks), st mõju OVI ja tootlikkuse vahel võib olla mõlemasuunaline.

Empiirilises analüüsis eristati 4 tüüpi ettevõtteid: kodumaisele turule orienteeritud KEd; välisturule orienteeritud KEd; kodumaisele turule orienteeritud VOEd; välisturule orienteeritud VOEd. Nii tavaline tootlikkuse näitajate erinevuse analüüs paneelandmete alusel ettevõtete grupiti kui ka paneelandmete ökonomeetriline analüüs näitavad tunduvalt erinevaid tulemusi Eesti ja Sloveenia vahel. Suurel määral on need erinevused seletatavad uuritud kahe riigi erineva majandusarengu tasemega ning erinevate välisinvestoreid motiveerivate teguritega Eesti ja Sloveenia puhul. Sloveenias on tööjõuga seotud tegureist investorite jaoks riiki investeerimisel olnud tähtsaim tööjõu kvaliteet, Eesti puhul aga vastupidiselt tööjõukulud. Taolised erinevused avalduvad nii analüüsides kahe riigi vahelisi töötleva tööstuse palgataseme erinevusi kui ka investorite investeerimismotivatsiooni alaseid küsitlusi. Tootlikkuse erinevused uuritavate ettevõttegruppide vahel sõltuvad ka sellest, tulenevalt Eesti ja Sloveenia suhtelisest väiksusest, kas analüüsi on hõlmatud suurimad töötleva tööstuse ettevõtted (nt Eesti puhul Elcoteq).

Uuring kinnitab ka varasemate uuringute tulemusi, et Eestis ja Sloveenias on VOEde tööjõu tootlikkus (*ceteris paribus*) keskmiselt kõrgem kui kodumaisel kapitalil põhinevates ettevõtetes. Lisaks tootlikkuse näitajate käsitlusele läbi viidud paneelandmete ökonomeetriline analüüs näitas, et Sloveenia töötlevas tööstuses on

väliskapitali olemasolu ettevõttes positiivselt korreleeritud antud ettevõtte enda tööjõu tootlikkuse tasemega. Ettevõttes väliskapitali olemasolu märkiv fiktiivse muutuja kordaja oli positiivne, suhteliselt suur ning statistiliselt oluline. Eesti puhul oli ettevõtte tasandil väliskapitali (enamusosaluse põhjal) olemasolu tähistava fiktiivse muutuja kordaja positiivne, peale ekspordile orienteeritust tähistava fiktiivse muutuja (ning vastava interaktsioonimuutuja) lisamist regressioonianalüüsi jäi OVI fiktiivne muutja positiivseks, kuid osutus statistiliselt ebaoluliseks.

Mudelites analüüsiti OVI nn "oma ettevõtte" efekti vastavalt eraldi ekspordile ja koduturule orienteeritud VOEde osas. Tootlikkuse näitajate ning ökonomeetrilise analüüsi tulemused näitavad mõlemad, et Sloveenias on ekspordile orienteeritud VOEdes tunduvalt kõrgem tööjõu tootlikkuse tase kui valdavalt kodumaisele turule orienteeritud firmades. Järeldused Eesti kohta kujunesid läbi viidud analüüsi alusel täiesti vastandlikeks Sloveenia kohta tehtutele – ekspordile orienteeritus koos väliskapitali olemasoluga ettevõttes tähendas Eestis keskmiselt tunduvalt madalamat tootlikkustaset kui kodumaisele turule orienteeritud VOEdes. Antud tulemus viitab suhteliselt suurtele erinevustele Eesti ja Sloveenia konkurentsieelistes maailmas. Sloveenial on konkurentsieelis seotud kõrgemat lisandväärtust loovate, kvaliteetset (mitte odavat) oskustööjõudu vajavate tegevusvaldkondadega. Eestisse investeerimisel on tähtis tegur (seni) hoopis madalad tööjõukulud.

Järgnevalt uuris autor empiiriliselt tööstusharusiseste (i.k. *intra-industry*; nimetatakse ka horisontaalseteks ülevooluefektideks, i.k. *horizontal spillovers*) välisefektide esinemist, esiteks kodumaisel kapitalil põhinevatele ettevõtetele, teiseks teistele VOEdele. Teooria alusel oodati pigem positiivseid välisefekte mõlemale ettevõtete grupile. Sloveenia töötleva tööstuse osas oli perioodi 1994 – 2000 aluseks võttes järgnevad: leiti positiivsed horisontaalsed "ülevooluefektid" VOEdelt kodumaisel kapitalil põhinevatele tootjatele, kuid negatiivsed horisontaalsed välisefektid VOEdelt teistele väliskapitaliga firmadele.

Eesti osas on järeldused jällegi, nagu "oma ettevõtte" mõjude analüüsil, täiesti erinevad järeldustest Sloveenia kohta. Ei leitud statistiliselt olulisi positiivseid või negatiivseid horisontaalseid välisefekte haru teistele kodumaisel kapitalil põhinevatele ettevõtetele, samas välisefektid teistele VOEdele olid positiivsed ja suhteliselt suured. Analüüsi

tulemused jäävad põhijärelduste osas samaks erinevate mudeli spetsifikatsioonide korral: nii juhuliku efektiga mudeli; fikseeritud efektiga mudeli; Heckmani tüüpi 2-astmelise valimi selektiivsusega mudeli; mudelite, kus üks või mitu suurimat ettevõtet on analüüsist välja arvatud (nt Elcoteq Eesti puhul) ning mudelid kus ekspordi orienteerituse mõõtmiseks on kasutatud mitte diskreetset, vaid pidevat muutujat (ekspordi osakaal käibest).

Otseste välisinvesteeringutega seotud majanduspoliitika alane kirjandus toonitab tihti ekspordile orienteeritud OVI soodustamise positiivseid aspekte, põhjendades seda ekspordile orienteeritud OVI arvatavate positiivsemate mõjudega sihtriigile. Autori empiiriline analüüs näitas, et antud lähenemisel on mitmeid puudusi, mis süvaanalüüsita võivad vaatluse alt välja jääda. Eesti puhul tähendaks kontsentreerumine eelkõige ainult ekspordile orienteeritud OVI soodustamisele võrreldes Eesti turule orienteeritud VOEdega, ka võimalikke negatiivseid mõjusid Eesti töötleva tööstuse arengule. Käesoleva uurimuse majanduspoliitika alane hinnang on, et keskendumine ekspordile orienteeritud OVI soodustamisele ei oleks parim majanduspoliitiline valik otseste välisinvesteeringute riiki kaasamisel. Senine antud valdkonna majanduspoliitika lähtekoht - nii VOEde kui kohalike ettevõtete võrdne kohtlemine - on eelistatum.