

Foreign Direct Investment and Technology Transfer
**The Case of the European Transition Countries and
the Automotive Industry in the Czech Republic**

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*Doktorin der Wirtschafts- und Sozialwissenschaften
(Dr. rerum politicarum)*

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dipl. ecc. **Elvisa Torlak**, M.E.S.
geboren in Mostar, Bosnien-Herzegowina

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Erstgutachter:	Prof. Dr. Thomas Straubhaar
Zweitgutachter:	Prof. Dr. Heiner Hautau
Vorsitzende der Prüfungskommission:	Prof. Dr. Anke Gerber

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Foreword

My beloved wife, **Elvisa Torlak**, author of this doctoral dissertation, died on June 18, 2010 in the age of 33, just before she could finish its final corrections after the successful defense, and complete its preparation for publication.

In compliance with her desire to finalize the dissertation, and in order to bear in remembrance her person and her work, upon an agreement with the Faculty of Business, Economics and Social Sciences of the University of Hamburg, I completed the remaining corrections which had been suggested by the board of examiners. My corrections include the layout of the title page, several captions of the figures and tables, citations and formatting the list of references, as well as some minor, typing errors. Although I did these corrections to the best of my knowledge, some errors and mistakes might still have remained. Though I hope the reader is going to forgive me for my incompetence in this field and will still understand the meaning of the information and the message expressed by the author herself.

In the name of my wife Elvisa I would like to express our warmest gratitude to all those who supported Elvisa during her studies and the research work, as well as in her last days while she was battling against her disease.

In particular, I would like to thank Elvisa's supervisor, Prof. Dr. Thomas Straubhaar, for his scientific guidance and the continuous encouragement in the Elvisa's research. A debt of gratitude belongs also to Prof. Dr. Heiner Hautau and Prof. Dr. Anke Gerber for their taking part in the board of examiners.

Particular thanks go to Ms. Hildegard Stahmer, as well as to the staff of Hamburgisches Welt-Wirtschafts-Archiv (HWWA), later Hamburgisches WeltWirtschaftsInstitut (HWWI), and to the staff and the colleagues from Europa-Kolleg Hamburg.

The financial support provided by Deutscher Akademischer AustauschDienst (DAAD) and Konrad-Adenauer-Stiftung is highly appreciated. Bureau van Dijk made their financial database AMADEUS available for the research in the final stage, which is also appreciated.

Deepest gratitude deserve of course Elvise's parents, Ćerim and Hasna Cokoja, who raised her and provided her the best guidance into the life, as well as her brother Elvis for his continuous support and love.

We owe warm gratitudes also to our friends – to the families of Dr. Ibrahim Hadžić, Dr. Hidajet Hadžić and Dr. Samir Muzaferija, to the families Hajrić and Bajrić in Hamburg, to Dr. Sebastian and Elena Gehrmann, for sharing many pleasant moments in Hamburg and Nürnberg, as well as to the employees of ProCredit Bank Sarajevo (former MicroEnterprise Bank) from the times when Elvise worked with the bank.

Our two children and I are indebted to Elvise for all her achievements in her young life. She gave us guidance and wise advice in various occasions, permanently kept supporting us and brought a lot of joy in our lives. Elvise gave me unlimited support and love while I was working on my dissertation. Hence, in accordance with her attitude that what is done should be done properly, and that the started things should be completed, I feel that publishing her work posthumously is the least what I can do for her to express my love and gratitude.

“In the name of God, the Most Gracious, the Dispenser of Grace:

READ in the name of thy Sustainer, who has created”

(Qur'ān, Sūrah Al-‘Alaq, 96:1, translation by Muhammad Asad)

Nürnberg, October, 2010

Dr.-Ing. Muris Torlak

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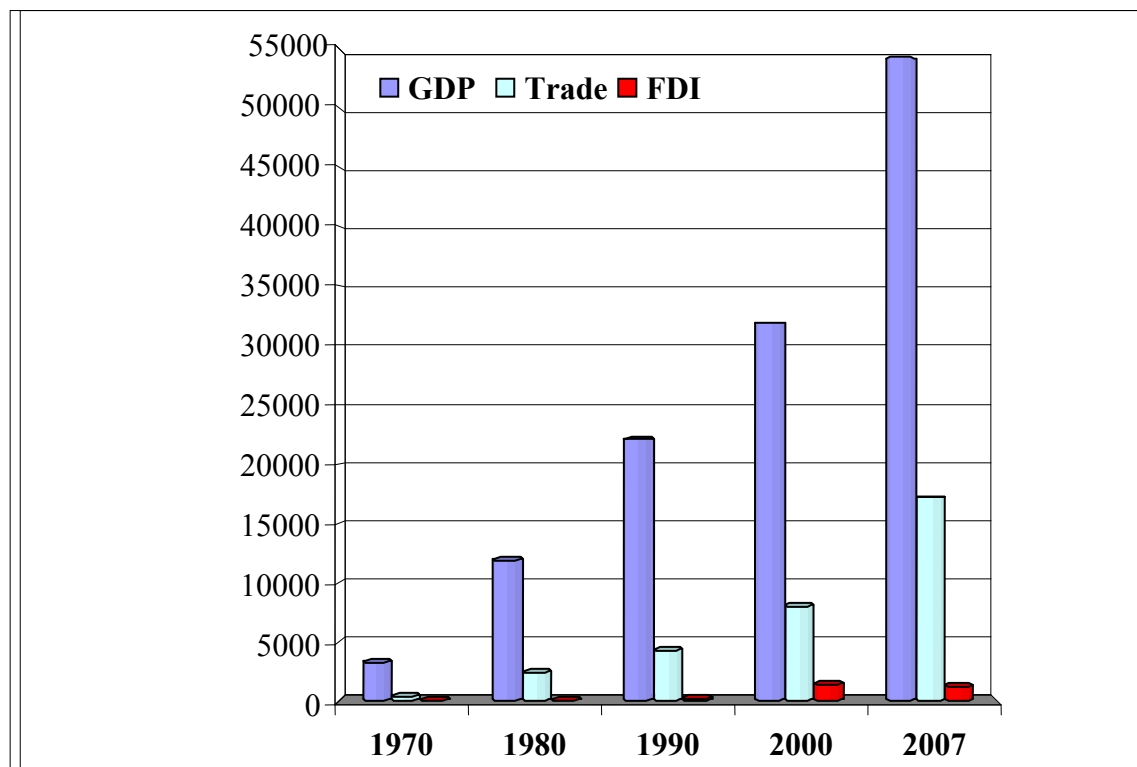
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1 Introduction

Many indicators illustrate the growing importance of transnational companies (TNCs) and their affiliates in the world economy. According to UNCTAD (2007), there exists some 78,000 transnational companies and about 780,000 their affiliates in the world today. The largest of these TNCs record yearly sales that are comparable to the aggregate output of entire countries like Norway, Ireland, Venezuela or Pakistan. The inward flows of foreign direct investments (FDI) grew steadily over the last four decades. In 2007, the flows reached \$1305 billion, just under the peak of about \$1400 billion achieved in 2000. Foreign direct investment is the most dynamic macroeconomic variable. Its value rose by about 20 times out of the annual FDI inflows in 1980, while global gross domestic product and trade increased five and seven times, respectively. In the meantime, global FDI inward stock accumulated to more than \$15 trillion, out of \$637 billion at the beginning of the 1980s. About 10% of the global exports of goods and non-factor services has been produced and exported by transnational companies and their affiliates.

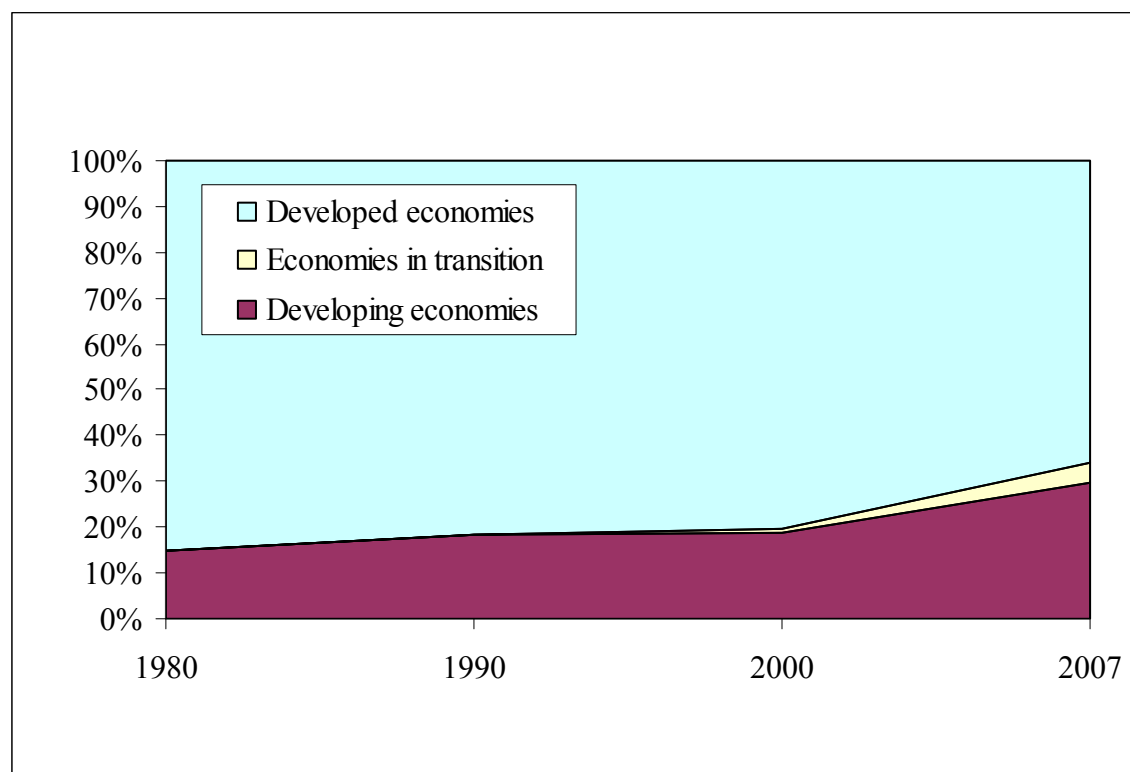
Chart 1.1: GDP, trade and FDI in USD billion



Source: UNCTAD, TNC/FDI database, <http://www.unctad.org/fdistatistics>

Although the bulk of global foreign direct investments flows between or toward the developed countries (about 65% of annual flows in 2006), the flows to developing countries and transition economies are increasing steadily (respectively 21% and 68% annual growth in 2006).

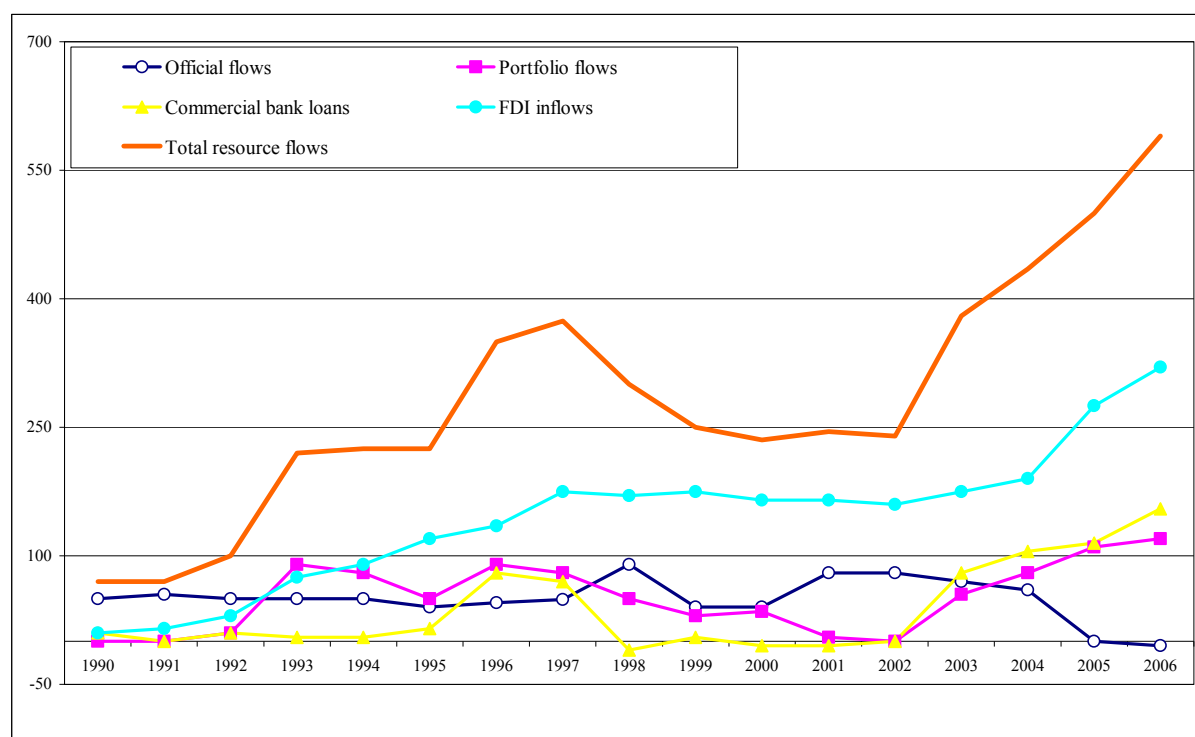
Chart 1.II: FDI inward flows by region



Source: UNCTAD, TNC/FDI database, <http://www.unctad.org/fdistatistics>

Especially for developing countries, foreign direct investments are gaining on importance becoming the most important source of capital. Already by the beginning of 1990s, FDI surpassed official flows several times, as well as portfolio investment and commercial loans. In 2006, a half of total resource flows to developing countries were foreign direct investments.

Chart 1.III: Total resource flows to developing countries by type of flow, 1990 – 2006
(billions of USD)



Source: World Bank (2007)

Therefore, it is no surprise that FDI has received tremendous attention in both academic and political discussions, and the present study is a contribution to the ongoing debate. Pages that follow bear a discussion on effects of transnational companies on FDI host countries and local firms, especially in the case of transition economies and in the light of expected technology transfer through foreign direct investment. To the rest of this chapter, the most important concepts and definitions of the study will be discussed. Chapter 2 gives an overview of recent developments regarding volumes and patterns of foreign direct investments. Chapter 3 delivers an overview of existing literature and theoretical background in the field. In Chapter 4, I test the hypothesis of positive effects of foreign direct investment on productivity in several Eastern European countries. In Chapter 5, I analyze the correlation between productivity spillovers and absorptive capacity of firms. Chapter 6 is a case study of the Czech automotive sector. In Chapter 7, I conclude.

1.1 Transnational companies, foreign direct investment and technology

The World Bank defines transnational corporations (TNCs) as “*incorporated or unincorporated enterprises comprising parent enterprises and their foreign affiliates. A parent enterprise is defined as an enterprise that controls assets of other entities in countries other than its home country, usually by owning a certain equity capital stake. An equity capital stake of 10% or more of the ordinary shares or voting power for an incorporated enterprise, or its equivalent for an unincorporated enterprise is normally considered as the threshold for the control of assets. A foreign affiliate is an incorporated or unincorporated enterprise in which an investor, who is a resident in another economy, owns a stake that permits a lasting interest in the management of that enterprise (an equity stake of 10% for an incorporated enterprise, or its equivalent for an unincorporated enterprise)*”¹ (UNCTAD 2007). Two most striking features of transnational companies are being involved in international operations and active and long-term relationship with entities outside the home country. The same distinguishes foreign direct investment from trade and licensing as other forms of foreign operations. Hence, foreign direct investment (FDI) is defined as “*an investment involving a long-term relationship and reflecting a lasting interest and control by a resident entity in one economy (foreign direct investor or parent enterprise) in an enterprise resident in an economy other than that of the foreign direct investor (FDI enterprise or affiliate enterprise or foreign affiliate). FDI implies that the investor exerts a significant degree of influence on the management of the enterprise resident in the other economy*” (UNCTAD 2007). The main focus of this study is on another important feature of transnational companies, namely their possession of certain competitive advantages that enable them to compete successfully in foreign, unknown markets.

There is no doubt about the importance of technology for economic development and growth. A long bead of theories and economic models include technological progress as one of crucial determinants of economic growth². As a matter of theory, technological progress augments the efficiency of labor force and thus increases productivity and international competitiveness.

¹ Besides “transnational corporations” other equivalent denominations: “transnational company”, “multinational company” and “multinational enterprise” are used in the literature.

² For an overview, see for example the works of Dosi et al. (1990), Broll and Gilroy (1994).

Diffusion of technology takes several channels:

- 1) trade,
- 2) the selling of technology on the market (by licensing, franchising etc.), and
- 3) internalized form, i.e. foreign direct investment.

In other words, technology transfer can be carried out through formal market transactions – transfers – or through informal, non-market mediated channels that might be voluntary or involuntary. We can think about several reasons why foreign direct investments do seem to be more attractive channel for technology transfer for developing countries than other forms of technology diffusion.

First, the international technology market is fragmented and ill-defined, and searching for the optimal technology deal can be costly and difficult. It lies in the nature of technology which can not be easily defined as a “product”. Consequently its price is also difficult to assess. The product is not well specified and the transfer can take many different forms. Much depends on how much of technical and other information is transferred. There exists an information asymmetry - the seller knows more about the “product” than the buyer does (otherwise it would have nothing to sell). Even with full information, the two parties can have different valuations of the technology, depending on their market positions, expectations and technological capabilities. Since technology is constantly changing, the valuation also depends on which vintage is being transferred and how its future evolution is foreseen. For these reasons, the price and terms of technology transfer are subject to bargaining and the accompanying uncertainty and non-transparency (UNCTAD 2003).

Second, given the nature of technology as difficult to specify, it is possible that the transfer of knowledge might be more successful in a direct contact and demonstration on the site, than the technology diffusion through other channels, e.g. trade. As a matter of fact, for many new technologies, internalized transfers are the only possible mode of transfer, since innovators are unwilling to part with them to unrelated parties.

Third, another advantage of internalized forms of technology transfer lies in the long-run commitment of the foreign partner to the project and its ability to provide the elements needed to adopt new technologies. Since all technologies need adaptation and improvement, foreign affiliates, with their base of high-level management and technical skills, tend to be in the

forefront of such activity in developing countries. In addition, TNCs have the experience of other affiliates in the developed and developing world to draw on, and can shift knowledge and personnel across countries to help with the upgrading of local capabilities (UNCTAD 2003).

Fourth, the typical features of TNCs – scale economies, high initial capital requirements, intensive advertising and advanced technology – are also industry characteristics that signal high barriers to entry, high concentration, and perhaps inefficiencies as consequence of low levels of competition. Entry by new domestic firms into such industries is likely to be difficult; TNCs, on the other hand, are not only likely to enter those industries but are best equipped to overcome the entry barriers. They can draw on their international chains of production and concentrate specific processes to few locations if scale economies are important entry barriers. They can seek financing on international markets if high capital costs made up barriers for entry. Barriers related to product-differentiation and technology are not likely to stop transnational corporations, since these features often characterize the TNCs themselves. The entry of TNCs into such monopolistic industries disturbs industry structure by increasing the level of competition that would force existing firms to become more efficient. However, foreign entry might lead to a fall in the number of firms in the industry, as least efficient local firms are forced out of business. This raises fears that foreign companies may outcompete all local firms and establish monopolies that are even worse than the domestic oligopolies they replace. Additionally, this might have negative effects on public budget since TNCs would repatriate profits and avoid taxation through transfer pricing.

Fifth, the TNCs undertake the major part of the world's private research and development (R&D) and produce, own and control the bulk of the world's advanced technology. According to UNCTAD (2005), the R&D spending of some large corporations exceeds that of many countries. In four TNCs (Ford Motor, Pfizer, DaimlerChrysler and Siemens), research and development spending cross \$6 billion in 2003. By way of comparison, in developing economies, South-East Europe and Commonwealth of Independent States (CIS) as a group, total gross expenditure on R&D came close to or exceeded \$5 billion in 2002 only in China, the Republic of Korea, Taiwan Province of China and Brazil. As major innovators, TNCs are the main sources of international technology transfer. Furthermore, it has been observed that

TNCs transfer newer technologies through foreign direct investment than in the case of technology transfer at arm's length³.

1.2 Transnational corporations, technology and ownership specific advantages

The growing importance of transnational companies released a lively discussion and a long bead of theories on multinational enterprises and foreign direct investments followed (see Chapter 3 for a detailed overview). While the very first analyses tried to give answers to why and how about foreign direct investments, recent models include productivity spillovers and technology as endogenous variables.

The fundamental aspect for analyses of foreign direct investments is technology. According to literature⁴, transnational companies possess some comparative advantages that enable them to overcome risks and costs related to operations in foreign, unknown markets⁵. Such comparative advantages consist of tangible and intangible resources that can be summarized as technology in its widest sense. Technology is an inherently abstract concept and therefore there is no ultimate definition of technology. In the contest of this study, technology is interpreted broadly as *“the perishable resource comprising knowledge, skills, and the means for using and controlling factors of production for producing...delivering...and maintaining goods and services”* (Robock 1980, p.2). It includes product, process and distribution technology, as well as all knowledge and know-how a firm possesses. It can also be separated into *“hardware”* that is made up of machines, tools, and other physical objects, and *“software”* that is captured in manuals, people, or organizations, and is necessary to operate plants and machines.

³ This is a controversial topic regarding foreign direct investment. A number of studies discuss on the “appropriateness” of the transferred technology to developing countries. Namely, the authors argue that transfer of capital intensive modern technologies to labor abundant developing economies disturbs factor intensity to the perils of factor labor, see e.g. the work of Jenkins (1990). At the same time, there are criticism on persistent regional concentration of R&D efforts by TNCs in several industrial countries and “shallow integration” of foreign affiliates. For deep integration to occur, however, host countries have to be able to provide not just cheap labor, but the whole array of modern skills, infrastructure, institutions, efficient business practices and supplier networks that TNCs need in order to be fully competitive in world markets. Only a few economies have reached this stage (UNCTAD 2003a).

⁴ See e.g. the work of Dunning (1993)

⁵ Markusen and Melvin (1988) recognized communication and transport costs, intercultural communication, consumer preferences, exchange rate risks and transaction costs as risks related to operations in foreign markets.

The purpose of foreign direct investment is to *internalize* the benefits of such proprietary assets and in that way retain the comparative advantages. Still, due to the nature of technology having public good characteristics, it seems impossible to completely exclude other parties. The technology disperses in FDI destination markets, and transnational corporations, i.e. their foreign affiliates are not able to reap all the productivity or efficiency benefits occurring in the host country's local firms. The relevant literature calls such an, from the point of view of transnational companies, involuntary transfer of technology, and resulting productivity improvements in local firms the *productivity spillovers*⁶.

1.3 Productivity spillovers

The term “productivity spillovers” occurred in theoretical literature already in 1960s. Through a range of studies several very concrete channels for spillovers were identified:

- efficiency increase by breaking supply bottlenecks,
- introduction of new know-how by demonstration of new technologies and training of local workers,
- break down of monopolies and stimulation of competition and thus efficiency increases,
- transfer of techniques for inventory and quality control and standardization in forward and backward linkages,
- adoption and imitation of modern management techniques in local firms.

Later studies, see e.g. Caves (1974), tried to create a taxonomy of different spillover channels, classifying spillovers into three categories, depending on the impact on local firm (for more details, see Chapter 3). However, for the purpose of this study I lean on the taxonomy applied by Kokko (1992) and distinguish between productivity spillovers that are primarily result of some learning process, like through *demonstration*, *imitation or contagion*, and effects that are mainly triggered by *increased competition* by entrance of foreign firms into the market. While learning processes have always a positive sign, the impact of increased competition by entrance of foreign firms is ambivalent. Depending on the industry structure, positions and reactions of local firms, more competition might have positive effects on productivity of local

⁶ The relevant literature employs also the term “technology spillovers”. In this study, the denomination productivity spillovers has been adopted. Although the spillovers are primarily associated with technology, the term “productivity spillovers” has a broader meaning since it covers also productivity growth triggered by increased competition resulting from the entrance of foreign firms and not only knowledge and learning related productivity improvements.

firms forcing them to become more efficient. However, the effects on local firms and host economy might be less beneficial. Namely, there exist fears that foreign entry may lead to fall in the productivity of and in the number of local firms, as less efficient local companies loose market shares and are forced out of business. This negative impact of competition might explain some controversial results of empirical analyses of productivity spillovers.

1.4 Empirical analyses of productivity spillovers

The search for empirical evidence of productivity spillovers was less conclusive than the theoretical foundations. In the focus of analyses were especially the effects on productivity at local firms in FDI destination countries. The first explicit empirical study of productivity spillovers by Caves (1971), examining the industrial pattern and welfare effects of FDI in Canada, was followed by numerous studies for different countries and regions (see Chapter 3 for an overview of relevant studies). Depending on the theoretical and methodological approach as well as on data employed, those analyses yield very ambiguous results. While in some countries or regions the effects of foreign presence are found to be positive, in another are those effects neutral or even negative. Chapter 4 of this study analyses the effects of foreign direct investment on productivity of local firms in five European transition countries.

It seems safe to claim that the presence of foreign firms does not automatically leads to productivity spillovers to domestic firms. The overall FDI effect depends on a whole range of factors such as: motivation for foreign direct investment, the form of investment, industry structure in destination market and reactions of domestic firms on additional competition, the overall business environment and public policies regarding foreign direct investment and interactions/linkages between foreign and domestic firms, etc. As one of the most important factors for expected positive externalities from foreign direct investments is the ability of domestic economies i.e. local firms to “*identify, assimilate and exploit outside knowledge*” (Kinoshita 2000). In Chapter 5, the productivity spillovers are put into correlation with research and development as proxy for absorptive capacity of firms in selected countries.

Following closely the methodology of earlier spillovers studies, I employ firm level data for five transition countries: the Czech Republic, Poland, Hungary, Romania and Bulgaria. Although this approach allows for testing of a broad range of hypothesis, the ambiguity of the results and differences between countries let little scope for generalization and illumination of

separate channels for productivity spillovers. Alternatively, case studies of specific industries and firms, over time, would avoid the aggregation problems and illuminate better the outgoing situations for productivity spillovers and interactions between foreign and local firms.

Besides above displayed taxonomy of productivity spillovers among those originating from learning and those triggered by competition, knowledge flows between firms can be horizontal (between firms in the same industry) and vertical (through forward and backward linkages). The present study focuses on the intra-industry spillovers⁷. However, as the more recent studies demonstrate, e.g. Javorcik Smarzynska (2004), and as the case study in Chapter 6 shows, linkages appear to have more potential for productivity spillovers than horizontal knowledge diffusion.

In order to overcome at least some of the shortcomings of the econometric studies and trying to illuminate additionally the phenomena of productivity spillovers through foreign direct investment, I present in Chapter 6 a case study of the automotive sector in the Czech Republic. Massive foreign direct investments in automotive industry triggered by the acquiring of Czech carmaker Skoda through German Volkswagen Group led to the formation of one of the most important European automotive clusters nowadays. The Czech economy hosts at present three major original equipment manufacturer and hundreds of automotive suppliers. The success story of Skoda and the Czech automotive sector shadows the less successful transformation of the pure domestically owned companies.

The case study makes clear how difficult the assessment of the single channels for productivity spillovers is, since the enterprise development and productivity as its proximate measure are a complex phenomena influenced by a number of interrelated factors and circumstances. Hence, the analysis of the impact of foreign direct investment on destination economies and industries requires location- and industry-specific analysis based on a sound theoretical framework.

The reader may expect some shortcomings in the present study, though I hope that the following chapters will deliver further insights into the direction and significance of the impact of foreign affiliates on productivity dynamics and the role of foreign direct investment in transformation process in Eastern European countries.

⁷ The analysis in Chapters 4 and 5 is based on the data aggregated at NACE Code level 2 industries, which implies that at least some part of the vertical linkages has been captured by this analysis.

2 Technology transfer through foreign direct investment

2.1 Theoretical framework

The global stock of foreign direct investment (FDI) has grown rapidly over the past decades – from less than \$600 billion in 1980 to more than \$15 trillion in 2006 – and transnational corporations (TNCs) have come to control a major share of the world's production and trade of goods and services. Numerous indicators bear witness to increasing globalization of the world economy. For instance, the short-term liquid assets controlled by multinational firms and banks headquartered in the U.S. were more than twice as large as those of all international monetary institutions in the world already in the early 1970s (Lall and Streeten 1977, p. 14). In 2006, transnational corporations and their affiliates accounted for some 10% of the world gross domestic product (GDP) and for one third of world exports. Some 78,000 transnational companies and their some 780,000 foreign affiliates employ worldwide almost 73 million people (UNCTAD 2007). The largest of these TNCs record yearly sales that are comparable to the aggregate output of entire countries like Norway, Ireland, Venezuela or Pakistan. It can be argued about the significance of those statistics, but quantitative and qualitative importance of TNCs can hardly be questioned. Transnational system of production is now the most dynamic element of the world economy and main driver of globalization processes. Hence the early conclusion of Lall and Streeten (1977, p. 11) that “any analysis of the present structure of international economic relationships which does not take TNCs into account, and, indeed, concentrate attention on them, runs the gravest risk of being unrealistic and irrelevant”.

In accordance with the history of foreign direct investment, the theory on transnational corporations is of relatively recent origin. The terms “multinational enterprise” and “transnational corporation/company” were only coined in the middle 1960s and early 1970s. Although, some theoretical explanations from the period between the wars can explain some aspects of international involvement of enterprises, the bulk of these explanations came in 1960s and 1970s as the international activities of firms intensified. Since then, foreign direct investment has received tremendous amount of attention in both academic and political discussions. A long bead of theories trying to explain foreign involvement of enterprises followed.

The early analyses of international involvement of firms, none of which gave a comprehensive explanation of foreign direct investment, achieved to explain different aspects of transnational corporations and their international activities and answer some questions, like “why do firms own foreign production facilities?” or “why do firms locate their activities in one country rather than in another?” or “why does the participation of foreign, relative to indigenous firms, differ between countries and sectors?”.

Something more encompassing explanations of international production appeared in early 1960s. One of them, based upon *industrial organization theory*, tried to deliver answer to “why” and “how it is possible” about international production. In this period, Hymer (1976) pointed to market imperfections as impetus for vertical integration and foreign direct investment. Hymer’s theory of monopolistic advantages sees the existence of firm-specific or “monopolistic” advantages as the central explanation for undertaking of business operations abroad. Firm-specific advantages cover not only product and process technology, management practices, etc., but also a positive product image, brand names and reputation.

Another approach, based upon *location theory*, attempted the problem of “where” about international operations of firms. This approach used field study data to extract and rank factors influencing location of international production. Both approaches gave static and descriptive theoretical reflections without trying to explain the dynamics of foreign investment.

Further contributions to the theory of international production have taken four main directions.

- 1) There have been extensions of the industrial organization approach. These have focused on evaluating the comparative advantages which are most likely to explain patterns of foreign direct investment. Authors identified *superior technology* and *innovative capacity* in the case of production goods and *product differentiation*, in the case of consumer goods, e.g. Vernon (1966).
- 2) Some authors have investigated financial aspects of foreign activities of firms, e.g. Alibert (1971).
- 3) Third approach attempted to explain the international production by an extension to the theory of firm. The theory of *market failure* has been used to explain the

international activities of TNCs. The basic proposition is that market failure in intermediate product markets and the need for firms to exploit the economies of interdependent activities, lead them to replace the market mechanism of cross – border transactions by internal hierarchies (Coase 1937; Buckley and Casson 1976, 1985; Rugman 1980). This approach succeeded to explain which route a firm chooses to enter a foreign market. This problem was deepened and systematically explored by Hirsch (1980) who produced a model identifying the conditions under which a firm might exploit its ownership advantages through exports or foreign direct investment.

- 4) Although, the theories of trade and production originated independently of each other, by the middle of 1970s they begin to converge and overlap. It was clear that trade and foreign direct investment are alternative forms of foreign involvement of firms. Dunning (1972) suggested that “only by considering trade and foreign production as alternative forms of international involvement in terms of ownership and location endowments could the economic implications of the UK joining the EEC be properly evaluated”. Dunning’s ideas evolved into most comprehensive explanation of foreign direct investment and transnational companies: the *eclectic paradigm approach*. Together with Vernon’s product cycle theory it represents the most comprehensive explanation of international involvement of enterprises.

2.2 Vernon’s product cycle theory

One of the most encompassing explanations of international activities of firms was that of Raymond Vernon by the end of 1960s. In his *product cycle theory* he observes the transnational operations of firms together with the development stages of a product. The starting point of his approach is the innovation as the impetus for the development of a new product. The probability to introduce a new product depends on the knowledge a firm has about the market. So according to Vernon (1966) “there is a good reason to believe, however, that the entrepreneur’s consciousness of and responsiveness to opportunity are a function of ease of communication; and further, that ease of communication is a function of geographical proximity”.

One implication of this fact is that producers in any market are more likely to be aware of the possibility of introducing a new product in that market than producers located elsewhere would be. However, the fact that the new product is introduced in one market does not

necessarily mean that the production automatically takes place at a location near to the market. In the Vernon's approach, the calculus of least costs decides about the location. Still, based on several studies concerning factors affecting the location of industry, Vernon identifies several conditions that producers are confronted with in the early stages of product cycle. First, the product itself may be quite unstandardized; its inputs, its processing and its final specification may cover a wide range. Regarding this, producers at this stage need a high degree of flexibility in their choice of location.

As a result of high differentiation of products or the existence of monopoly in the early stages, price elasticity of demand is comparatively low. Thus, entrepreneurs have no incentive to look for lower production costs.

Since the product is still developing intensively, the need for the communication with the customers, suppliers and even competitors is especially high at this stage.

Vernon remarks well that location specific considerations in the initial stages of the product introduction extend beyond factor cost analyses plus transport costs. All of these considerations tend to argue for a location in which communication between the market and the producer is the best.

Second phase in the product cycle is characterized by a further standardization of the product. However, Vernon reminds that it does not mean the end of the differentiation, but that it even increases. Still, certain general standards seem to become typical. The inputs, process and product itself are known to producer, customers as well as to competitors and can be anticipated. Elasticity of demand is growing. The standardization of the product opens up technical possibilities for achieving economies of scale through mass output.

As demand for the new product appears in other advanced countries, entrepreneur will begin to think about setting up a local producing facility. When the entrepreneurs will decide to invest in production facilities abroad depends on its costs calculation. If economies of scale are being fully exploited, the principal differences between any two locations are likely to be labor costs. However, Vernon underlines the limited explanatory power of such a hypothesis and adds factors as threat of a new competition in the country of import, the level of tariff

protection anticipated for the future, the political situation in the country of prospective investment and so on.

However, according to various empirical studies, the decision – making sequence used in connection with international investments is not a model of the rational process. But Vernon identifies the galvanization force to action – the threat to established position of an enterprise.

In an advanced stage in the standardization of a product, the less developed countries may offer competitive advantages as a production location. Low labor costs may be initial attraction drawing the investors to less developed areas. However, the location considerations are still more complex and encompass a wider range of factors. Vernon thought about what characterizes the products whose production might be located in less developed areas. He discern such products as those whose production requires significant inputs of labor; the products with high price elasticity of demand; production does not rely heavily upon external economies; products which could be precisely described by standardized specification and which could be produced for inventory without the fear of obsolescence; high – value products capable of absorbing significant freight costs.

What are implications of Vernon's approach in less developed countries? Contrary to the Heckscher – Ohlin's theorem according to which one presumably ought to anticipate that the exports of the less developed countries would tend to be relatively labor – intensive products, Vernon approach suggests that in the most mature phase of the product cycle, in which the product is highly standardized, the production may be allocated toward the regions that can offer lower, foremost, labor costs, i.e. less developed regions. That means that less developed countries become net exporter of these high standardized, capital intensive products.

On the other side, Vernon's approach suggests that firms tend to locate the production of the new, unstandardized products there where the product initially was born. Furthermore, multinational enterprises tend to conduct the research and development activities at home.

In his approach Vernon tried to answer basically two questions: *how* and *why* it comes to entrepreneur's activities abroad. Vernon succeeded to identify the critical moments and motives for international production. Moreover, the approach identifies the conditions upon which it comes to an international involvement. However, it seems that Vernon neglected the

different forms of operations in foreign markets. Also, he paid no attention to firm (i.e. ownership) and location specific advantages.

2.3 Eclectic paradigm approach

Another attempt to give an encompassing explanation of production abroad came from Dunning (1980, 1981).

Being aware of the incompleteness of existing approaches to explanation of international production, Dunning tried to make a synthesis of many theoretical approaches in form of an eclectic analysis. His approach deserves the attribute eclectic for three main reasons. First, it integrates elements of the main lines of explanation of international operations; second, it can be used to explain all types of foreign direct investment and third, and may be most important, it embraces three main vehicles of foreign involvement by enterprises, that is, direct investment, trade and contractual resource transfer, e.g. licensing, technical assistance, management and franchising agreements. Furthermore, the model suggests which of alternative forms of international involvement the enterprise is likely to choose.

Dunning defines the multinational enterprises as companies that undertake productive, i.e. value-adding activities outside the country in which they are incorporated. The extent to which they engage in foreign production depends on comparative ownership advantages (O) vis-à-vis host country firms, and the comparative location – specific (L) endowments of home and foreign countries.

Ownership-specific (O) endowments are internal to the enterprise and consist of tangible and intangible resources, including technology which itself dictates the efficiency of resource usage. Dunning distinguishes between three types of O advantages. The first comprises those which every firm may have over another producing in the same location as access to markets or inputs not available to competitor; or in size; intangible assets as patents, trademarks, management skills. Second and third type of advantages arise from the ability of enterprises to better co-ordinate the interaction between separate but complementary activities better than other organizational mechanisms, e.g. market. These advantages arise from those that a branch plant may have over a completely new enterprise. The third advantage arises

specifically from the “multinationality” of a company (the know-how in international operations and different markets).

Location-specific endowments include not only Ricardian type resource endowments, but the social, legal and commercial environment in which the endowments are used, as well as government legislation and policies. These advantages are external to a particular enterprise. So, according to eclectic paradigm a firm will engage in foreign value-adding activities if and when three conditions are satisfied:

- 1) It possesses net *ownership (O) advantages* vis-à-vis other firms in a particular market. These advantages take form of the possession of intangible assets or the advantages of common governance.
- 2) Assuming condition (1) is satisfied, it must be more beneficial to the enterprise to use the superior assets itself rather than to sell or lease them. The advantages arising from the own use of these assets are called *internalization (I) advantages*.
- 3) Assuming conditions (1) and (2) are satisfied, it must be in global interest of the enterprise to utilize these assets in conjunction with at least some factor inputs outside its home country; these advantages are *locational (L) advantages*.

As policy recommendations of his approach, Dunning discusses three effects of TNCs. He agreed that in some instances, TNCs have been an integrating force and have taken advantage of existing factor endowments, thus contributing to more efficient use of resources. In Central European countries, TNCs trying to rationalize their activities promoted rational use of resources. As Dunning (2003) noted, “TNCs brought mobile capital goods to immobile natural resources including labor and employed them in a profitable economic activity”. According to him especially in the case of former centrally planned economies TNCs gave an important contribution to employment situation by restructuring and employing of available resources.

Frequently expressed criticism about TNCs is on their tendency to spatial specialization, in particular, the centralization of R&D activities in the FDI home country. Dunning argues that it does not necessarily mean that, without TNCs, the distribution of innovative activities would have been any less centralized. Furthermore, the same conditions which lead to internalization of other types of production hold for technology as a good too. As Chapter 6 shows, the Czech Republic has become an important location not only for production but also

for R&D projects by multinational automotive companies. Dunning also criticizes Kojima's rigid approach according to which the effects of direct investment depend on motives for these investments. Even in the case of technology as product, Dunning sees interaction between developed countries, which transplant high technology industries toward less developed areas with abundance of inputs as labor or natural resources, as beneficial to both sides.

Dunning's approach gave answer to several questions related to when, why and how the international production takes place. But as Dunning himself noted, the approach gives no answer about which firms or which location will be involved in foreign production (Dunning 2003).

2.4 TNCs at the world technology market

It is well known that TNCs today undertake the major part of the world's private research and development (R&D) and play the crucial role in the development, application and dissemination of the world's advanced technology. In spite of some movements towards developing countries, the bulk of R&D follow up in a few developed countries, whereas other TNCs' activities as investment and production are widely spread all over the world.

A few statistics witnesses on concentration and origin of private R&D and modern technologies.

Over four fifths of the global stock of FDI originates from the half dozen home countries that dominate the world's research and technology: the U.S., the U.K., Japan, Germany, Switzerland and the Netherlands (Kokko 1992, p. 20). Although the FDI inflows increase steadily both in developed and developing countries, the bulk of them seem to circulate between several developed economies. The share of the top five FDI recipients in the world total fell from about 70 % in 1980s to 50 % in 2005. As UNCTAD (2006) reports, the share of the Triad (the EU, Japan and the United States) in total world inward FDI flows and stocks has fluctuated at around 60-70 %. In 2004, 85 of the top 100 transnational corporations originated from these regions. Five countries - the United States, the United Kingdom, Japan, France and Germany - accounted for 53 out of 100 firms, while 53 firms were from the EU alone. At the same time, the developing countries have gained in importance as recipients of FDI in terms of both inward flows and stocks. Still their share in total world inflows reached

only an average of 35% in 2003-2005, rising from an average of 20% in 1978-1980 (UNCTAD 2006). Only five out of top 100 transnational companies were from developing countries in 2005.

2.5 From OLI paradigm to technology spillovers

In spite of the concentration, the technology diffuses over the borders and companies' frontiers. This process takes several forms, and these are often more hidden than obvious and straight ahead. One of the reasons might origin in the nature of technology. Under the term of technology we understand a broad concept of *“the perishable resource comprising knowledge, skills, and the means for using and controlling factors of production for producing... delivering... and maintaining goods and services”* (Robock 1980, p. 2). It can also be separated into “hardware” that is made up of machines, tools and other physical objects, and “software” that is captured in manuals, people, or organizations, and is necessary to operate plants and machines (Kokko 1992, p. 21). Technology is a broad and complex concept and none of the available measures of technology and technology production – such as R&D expenditures, numbers of new plants, payments for licenses and royalties, stocks of capital equipment, and so forth, is an all-embracing measure.

Another reason is that technology diffusion takes several forms: formal market transactions and informal, non-market mediated channels that might be voluntary and involuntary.

Table 2.5.I: Channels for International Diffusion of Technology –
Type of Transaction and Role of TNCs

Type of Transaction	Role of TNCs	
	ACTIVE	PASSIVE
FORMAL	Joint Ventures Licensing	Goods trade
INFORMAL	Linkages	Trade journals, Scientific exchange

Source: Kokko (1992, p. 22)

The difference between FDI and for example joint ventures and licensing is in the fact that in case of FDI multinational companies has chosen to retain the control and ownership of its

proprietary technologies within the corporation. It has been argued that foreign direct investment as a form of international involvement has the highest potential for productivity spillovers, although its genuine purpose is exactly to *preclude* these spillovers.

As we see technology seems to be the crucial element in the discussion on transnational companies and productivity spillovers. Obviously, technology is the most distinguishing attribute of TNCs, since it is the most fundamental of the proprietary assets that allow firms to become multinational and compete successfully in foreign markets. Also, from the perspective of host countries, technology imports by foreign affiliates are perceived as one of the essential benefits from foreign direct investments, since it seems the most reliable way of getting a long-run access to modern technologies. This study looks at this part of activities of TNCs and in particular at its effects on local firms' productivity in FDI host economies. In other words, those technology or productivity spillovers from FDI will be examined, which have been depicted in the literature as the most relevant channel for the diffusion of TNC technology to firms in host countries. As already mentioned, we talk about technology spillovers when entry or activities of TNC affiliates lead to upgrades in the technology and increases in productivity of local firms, whereas the TNC "*cannot capture all quasirents due to its productive activities, or to the removal of distortions (caused) by the subsidiary's competitive pressure*" (Caves 1974, p. 176).

As we see the theoretical concept of productivity spillovers rests upon two fundamentals:

- first, there comes to a transfer of technology on the market (in this study we focus on transfer from foreign to domestic companies presuming superior technology on the side of foreign affiliates, whereas technology may be transferred also between foreign companies), and
- second, this transfer proceeds without the consent of foreign affiliates, i.e. foreign firms dispose of none or only limited instruments (such as patent rights) to ban this process or to extract the full price for the technology transferred.

Recalling the fact that foreign affiliates imported their superior technology primarily from parent companies, it seems reasonable the differentiation by Kokko (1992) between *technology transfer* as this original and deliberate dissemination of technology within TNCs and *technology diffusion* that "takes place without the conscious participation of the TNC and their affiliates, through spillovers of various types."

According to eclectic paradigm presented above, the possession of superior technology is condition sine qua non for an enterprise to become a transnational company. The facts presented above witness that transnational companies produce and hold the bulk of modern technologies now days. Taking this into account, this study focuses on the host country perspective of technology imports by TNC affiliates. Do spillovers of modern technology from foreign to other enterprises really exist and do they result in productivity improvements in local firms operating in FDI destination markets? Within the term “spillovers” we understand all those forms of technology diffusion by which the operations of foreign affiliates lead to improvements in the technology or productivity of domestic firms and where foreign affiliates are not able to extract the full value i.e. rent out of these gains. Relevant literature denominated this phenomenon also as “external effects” or “involuntary technology diffusion”⁸.

Although the new growth theory does emphasize the importance of technology spillovers and the terminology such as “external effects of human capital” (Lucas 1988) or “partial non-excludability of knowledge” (Grossman and Helpman 1997) make allusions on the nature of spillovers, a comprehensive theory on productivity spillovers still does not exist. Besides its genuine purpose to explain the emergence of multinational companies, OLI paradigm provides also an implicit explanation for an international and firm-intern transfer of technology. *If the internalized firm-specific assets are technology in its widest definition, then are foreign subsidiaries the carrier of international technology diffusion*⁹.

⁸ Growth theory attributes great importance to externalities in the process of economic growth and development (Romer 1986, 1990; Lucas 1988; Grossman and Helpman 1997).

⁹ In spite of all “superiority” of technology transferred through foreign direct investment compared to joint ventures and licensing, it is still a question how modern this technology is. Behrman and Wallender (1976), Mansfield et al. (1979) and Mansfield and Romeo (1980) hold a view that firm intern transferred technology is newer than that transferred via joint ventures and licenses. Das (1987) shows theoretically that even in the presence of positive externalities to the benefits of domestic firms, the transfer of “better technology” is still beneficial for multinational companies. Numerous empirical studies find evidence of innovative activities of multinational companies, but also argue that those are located mostly in high developed industrialized countries or in subsidiaries in high developed locations (Dunning 1993; Blomström and Kokko 1996; Cantwell 1995; Inzelt 1998; UNCTAD 1999).

2.6 Theoretical concept for explaining of productivity spillovers

The theoretical foundations for the explanation of productivity spillovers is the level of firm-specific assets that TNCs are assumed to possess in order to overcome the higher transaction costs they face in foreign markets (Hymer 1976; Dunning 1993). These costs arise as firms are unfamiliar with foreign market, demand characteristics, supplier links, etc. The internationally operating firms are confronted with certain risks arising from information asymmetry. Some of these projects may fail for various reasons, with potential negative effects on the parent company. One of the possible reasons for failure is disadvantage of being foreign, another is the existence of cultural, social and institutional differences between home and host economies, and the third is the increasing need for coordinating activities and concomitant organizational and environmental complexities (UNCTAD 2006). The counter value or “antidote” to those risks are firm specific assets which base on superior technology that foreign firms possess. An illustration of this fact is a note that more than 80% of royalty payments for international technology transfer were made by affiliates to their parent companies (UNCTAD 1997). The empirical evidence of differences in productivity levels between foreign and domestic firms in favor of TNCs appears to be convincing, see e.g. the works of Griffith and Simpson (2002) and Girma et al. (2001).

However, following Dunning’s thesis the purpose of undertaking international transaction in form of foreign direct investment is exactly the internalization of comparative advantages arising from superior technology. Though, the modern technology also has some characteristics of a public-good: excluding other (in this case local) firms from obtaining the knowledge can be difficult. On the one side transnational companies hold superior technology and try to internalize the gains from it by involving internationally through foreign direct investment. On the other side, the nature of technology having characteristics of public-good make it impossible for TNCs to internalize completely all advantages from superior technology. The resulting difference is the potential for productivity spillovers in FDI host economies.

2.7 Identifying Spillovers

The productivity spillovers are very difficult to measure and even to observe. Though, a decent part of economic literature focused on productivity spillovers. Kokko (1992) identifies several possible reasons for this.

First reason why the technology transfer through productivity spillovers might be important is that the respective technologies might not be available in the market. Following Dunning (1981), firms have three possible ways to exploit their technological advantages internationally: (i) through exports, (ii) by selling i.e. licensing its technology to foreigners, and (iii) by establishing affiliates abroad and so keeping the full control over the production and technology employed. However, the nature of technology makes the markets for it mostly imperfect, which makes the transaction costs for sales of technology to outsiders high (Buckley and Casson 1976; Teece 1977).

Another reason for importance of productivity spillovers is that direct contact with users appears to be a principal factor explaining technology diffusion, see the works of Gomulka (1990) and Gottinger (1987). Before a new process or product innovation is widely spread on the market, potential adopters have limited information about the costs and benefits of the innovation and may therefore associate with a high degree of risk. As they come in contact with users, information also becomes available, risk decreases, and the likelihood of imitation or adoption of the innovation increases. In this way, the entry of foreign affiliates may demonstrate the existence and profitability of new products and processes, and encourage local firms to adopt some of them. This is an argument for productivity spillovers even when access to new technology is not restricted by proprietary factors, because information about foreign technology is generally more expensive for local firms than for TNC affiliates. In addition, it can be assumed that “*contagion*” effects are more important for less developed host countries, where indigenous skills and information are in shorter supply (Kokko 1992, p. 27).

Third reason why we expect positive external effects from TNC entry originates from some of the neo-classical theories of foreign direct investment, e.g. Caves (1971, 1996). The typical features of TNCs – scale economies, high initial capital requirements, intensive advertising, and, not least, advanced technology – are also industry characteristics that signal high barriers

to entry, high concentration, and perhaps some inefficiencies that follow from low levels of competition. Entry of domestic firms into such industries is likely to be difficult; TNCs on the other hand are both likely to enter just those industries and be well equipped to overcome the entry barriers. They can coordinate their international operations and concentrate specific processes to new locations if scale economies are important entry barriers. They are also able to overcome high capital costs barriers by seeking financing on international markets. Barriers related to product-differentiation and technology are not likely to stop a TNC, since these are the most striking characteristics of multinational firms.

2.8 Studies of productivity spillovers

The pioneering theoretical studies of productivity spillovers from foreign direct investment date back to the early 1960s. The first author to systematically include technology spillovers (or external effects) among the possible effects of FDI is MacDougall (1960), who analyzed the general welfare effects of foreign investment. Corden (1967), looking at the effects of FDI on optimal tariff policy, and Caves (1971), examining the industrial pattern and welfare effects of FDI, also pay attention to productivity externalities outgoing from international operation of firms. Here are technology spillovers discussed together with several other indirect effects that influence the welfare assessment, such as those arising from the impact of FDI on government revenue, tax policies, terms of trade, and the balance of payments. The fact that spillovers are taken into account results from empirical evidence on productivity spillovers rather than by comprehensive theoretical arguments – the detailed theoretical models analyzing spillovers appeared only in the late 1970s.

Several of the empirical studies that have inspired the early theoretical analyses are Balasubramanyam (1973), Brash (1966), Deane (1970), Dunning (1958), Forsyth (1972) and Rosenbluth (1970). In summary, these studies depict several channels for productivity spillovers such as:

- Increasing efficiency by breaking supply bottlenecks;
- Introducing new know-how through demonstration of modern technologies and by training of workers who later might move to local firms and transfer the knowledge;
- Changing industry structure, either by breaking down monopolies and stimulating competition and efficiency or creating a more monopolistic industry structure, depending on the strength and responses of the local firms;

- Transferring techniques for inventory and quality control and standardization to their local suppliers and distribution channels;
- Forcing local firms to increase their managerial efforts, or to adopt some of the marketing techniques used by TNCs.

Besides those learning aspects about transnational companies, one of the most important impacts of the entrance of a foreign plant into a market is related to changing competition patterns in the market.

Caves (1974) takes this more explicitly into his analysis. He looks particularly at the impact of FDI on local firms and classifies possible spillovers into three categories.

- First, he argues that TNCs may improve *allocative efficiency* by entering into industries with high entry barriers and reducing monopolistic distortions.
- Second, the entry of TNCs may induce higher *technical efficiency* if the increased competitive pressure or some demonstration effect spurs local firms to more efficient use of existing resources.
- Third, TNC presence may lead to increase in the rate of *technology transfer* and diffusion, because of competition, continuous imitation, or other reasons.

In contrast to earlier models that tried predominantly to identify spillovers and circumstances under which it comes to technology diffusion, newer analyses take the existence of various types of spillovers for granted and try to analyze the determinants and consequences of spillovers for host (and home) countries, without giving any normative welfare conclusions of the kind attempted by the earlier authors.

The earliest models in this tradition seem to be those of Findlay (1978) and Koizumi and Kopecky (1977). In a simple dynamic model with foreign direct investment and technology transfer from an “advanced” developed economy to a “backward” developing country, Findlay examines some steady-state characteristics, such as the size of the technology gap between the countries and the share of foreign capital. The rate of technological diffusion (or spillovers as defined earlier) to the backward country is described as a combination of two related effects. On the one hand, Findlay (1978) refers to Gerschenkron (1962) and Veblen (1915), who hypothesize that the rate of technological convergence may be higher “the greater the backlog of available opportunities to exploit”. Thus, diffusion may be faster when

the technology gap between the home and the host country is larger. At the same time, it is assumed that technology spreads more smoothly when there is contact between those who already have the technology and those who are to adopt it, in analogy to the spread of a disease. This *contagion* effect implies that diffusion is faster the higher the TNCs share of the backward country's capital stock. Changes in some exogenous parameters – the rate of progress in the advanced country, the tax rate on the TNCs profits, the educational level of the host country, and the host country's savings propensity – may affect the gap or the foreign share, and thereby also the incidence of spillovers, but both the gap and the foreign share are assumed to be independent of the decisions and actions taken by local firms.

Koizumi and Kopecky (1977) also analyze effects of foreign direct investment on growth, but in the framework of a model of long-term international capital movements. They assume that the private marginal return on domestic and foreign capital is equal, but that the technology embodied in foreign capital, due to its public good nature, generates an additional benefit to society: the extent of this spillover is related to the foreign ownership of a country's capital stock, as in previous model.

One of the implications of those analyses is, as they argue, that some of the conclusions of standard models of international capital movements have to be modified. In the traditional model, the “*steady-state capital-labor ratio is determined solely by the characteristics of the production function and the exogenous world interest rate*” (Koizumi and Kopecky 1977, p. 53), and international capital movement occurs when the domestic funds exceed or fall short if the amount necessary to reach that ratio. Exogenous changes in the domestic savings propensity have an impact only on the international net debt in steady-state. In the model with spillovers, however, the capital-labor ratio depends on the foreign share of capital. Spillovers from foreign capital raise the social marginal product of capital above the world interest rate, which stimulates domestic capital accumulation and leads to a higher capital-labor ratio.

In terms of taxonomy mentioned above, it appears that both Findlay's convergence and contagion effects and the spillovers in Koizumi and Kopecky's model belong to the group of productivity spillovers triggered by demonstration and imitation, i.e. technology differences between TNCs and locals are the main determinants of spillovers. Spillovers related to competition are not explicitly included, although Findlay (1978, p. 5) notes that contact with TNCs can induce local firms to “*try harder*” and that “*the visible example of a high standard*

can inspire those with a lower level of achievement to perform better". Moreover, spillovers are assumed to be "*automatic*", in the sense that they depend only on exogenous factors, and not on the behavior and decisions of foreign affiliates and local firms.

The most recent models have progressed towards making spillovers endogenous, and have also included the level of competition among the determinants. Das (1987) observes that spillovers make up a cost for the TNC affiliate, since the benefits gained by local firms sooner or later translate into increasing competition. He then proceeds to examine the optimal behavior of the TNC when these costs are recognized. Assuming that spillovers are directly related to the quantity of TNC output, Das shows that the output price charged by the TNC is higher when spillovers take place. Since the price increase leads to a fall in the volume of output from an initially optimal level, the profit by TNC reduces in short term. But this loss is more than compensated by the gains that come about in the long run. The reduction in TNC's output means that fewer spillovers will materialize, and that the competitiveness of local firms will increase at a slower rate than if prices had remained unchanged.

Das (1987) also concludes that imports of additional technology are always profitable for the multinational, in spite of spillovers. However, technology transfer is assumed to be costless, and will only lead to a fall in the unit costs of production of the affiliate. The conclusion seems therefore trivial. The merit of the model lies in its recognition of the fact that TNC affiliates are aware of spillovers, and that this has some effect on their behavior: yet, the behavior of local firms is still not taken into account explicitly.

Wang and Blomström (1992) extend this reasoning by noting that technology transfer is costly, and that local firms are also aware of spillovers. Accordingly, they treat spillovers as an endogenous variable resulting from the strategic interaction between TNC affiliates and local firms. In essence, they model a differential game involving an TNC affiliate and a local firm, where both solve their individual dynamic optimization problems subject to the other firm's actions. The TNC's objective is to choose, for each time period, how much to invest in imports of new technology, and the local firm's objective is to decide how much to invest in learning to imitate TNC technology, given that both know the other party's decisions, and that:

- a) a larger technology gap gives the TNC affiliate's products a "quality advantage" that translates into a "quasi-rent", whereas the profit of the local firm is negatively related to the size of the technology gap,
- b) technology transfer is costly, and newer and more complex technologies are more expensive to transfer,
- c) the technology gap between the firms grows as new technology is imported, but diminishes as a result of the local firms' efforts, and,
- d) some spillovers that are proportional to the size of the technology gap always take place irrespective of the local firm's active learning efforts, as discussed by Findlay (1978).

The differential game is solved by defining the steady-state equilibrium conditions for each party's optimal control problem, subject to the other's decisions, and then finding the combination of technology import and learning decisions that fulfills the conditions for a unique, locally stable steady-state Nash equilibrium. Such an equilibrium is shown to exist.

The most interesting conclusion of the model is that the total amount of spillovers of TNC technology is not exogenously fixed (although some spillovers may occur automatically). Instead, both the TNC affiliate and the local firm are able to influence the extent of spillovers through their investment decision. The more the TNC invests in new technology, the higher the spillovers, *ceteris paribus*, because they are related to the size of the technology gap; the more the local firm invests in learning, the more TNC technology it is able to absorb through spillovers. In addition, there is also a multiplicative second order effect, since an improvement in local technology (e.g. as a result of spillovers) will reduce the technology gap, cut into the TNC affiliate's quasi-rent, and force it to import new technology (part of which may also spill over) in order to restore its profitability and market shares. Analogously, an increase in the technology gap may force local firms to spend more resources on learning.

Although they overlap mostly and it is almost impossible to make clear distinction between them, the most appropriate taxonomy for the present study and the following econometric analyses in Chapter 4 and 5 is the one distinguishing between effects on local productivity that are primarily consequences of some learning process - *demonstration, imitation and contagion* and those effects that are foremost triggered by *competition pressure* arising from changing industry structure along with the entrance of foreign affiliates into the market. We can think of several concrete modes of how productivity spillovers take place .

2.9 Studies of productivity spillovers in CEECs

There have been quite a few studies of productivity effects of foreign direct investment in CEECs. As Kinoshita and Campos (2003) referred to transformation process in CEECs as forming “a unique situation akin to a natural experiment”, different aspects of this process caught the attention of economic analysts.

At the very beginning, the research focused on macroeconomic effects of foreign direct investment as its impact on balance of payment, labor market, economic growth and restructuring of economies. Different privatization methods and their impact on quantity and quality of foreign participations over CEE countries received also attention in several years of FDI history in Central and Eastern Europe. Gradually, with theoretical literature suggesting the most important effects from foreign direct investment outgoing from its impact on market structure and particular firms, studies have examined effects of foreign direct investment on the recipient domestic firms, on their wages and productivity. Recently, a huge part of the literature focused on spillovers of productivity and wages to indigenous firms and the entry and exit of indigenous firms.

Table 2.9.I gives an overview of selected studies for CEE countries. All of these countries received some attention but the more important FDI destinations have received more attention than smaller ones.

Table 2.9.I: Selected studies of host country spillovers in CEECs

Author(s)	Countries	Focus/Method/Data	Main results
Gersl et al. (2008)	Central and Eastern Europe	Firm level data	Vertical spillovers more important than horizontal. Negative horizontal spillovers. Spillovers dependent on absorptive capacity, export orientation and firm size.
Gorodnichenko et al. (2007)	26 countries of CEECs (including Turkey) and CIS.	Micro data. Vertical and horizontal spillovers. Technology gap.	Positive spillovers from backward linkages and zero-effect of forward linkages. Horizontal spillovers only for large firms. Distance from the technological frontier dampens the positive horizontal spillovers.

Kolasa (2007)	Poland	Firm level panel data	Local firms benefit from foreign presence in the same industry and in downstream industries. Absorptive capacity of domestic firms is highly relevant to the size of spillovers. Competitive pressure facilitates backward spillovers, while market power increases the extent of forward spillovers. Host country equity participation in foreign firms is consistent with higher unconditional productivity spillovers to domestic firms.
Vahter (2005)	Estonia	Firm-level panel The role of absorptive capacity for productivity spillovers	Export or domestic market orientation of the affiliate may be important for TFP. No evidence for importance of indicators such as exporting, R&D activity or intensity of technology in the sector for horizontal spillovers.
Altomonte and Pennings (2005)	Romania	Firm-level panel for the period 1995-2001. Controlling for the simultaneity bias in productivity estimates through semi-parametric techniques.	Positive from initial foreign investment but negative as foreign share grew.
Kosová (2005)	Czech Republic	“Crowding out” of indigenous firms	Evidence of positive technology spillovers after the initial setback.
Damijan and Knell (2005)	Estonia, Slovenia	Impact of methods of privatization on the pattern of technology transfer to domestic firms	The method of privatization does influence the way a firm obtains technology from abroad.
Javorcik Smarzynska (2004)	Lithuania	Firm-level data. Linkages spillovers	No intra-industry spillovers; spillovers to upstream industries.
Sinani and Meyer (2004)	Estonia, 1994-1999	Production function framework. Panel data techniques, industry and firm specific effects and Heckman two-stage procedure to control for sample self-selection bias	The magnitude of the spillover effect depends on the characteristics of incoming FDI and of the recipient local firm. Spillovers vary with the measure of foreign presence used and are influenced by the recipient firm's size, its ownership structure, and its trade orientation
Damijan et al. (2003a)	Czech Republic, Hungary, Poland, Bulgaria, Romania,	Static panel data analyses	Transfer of technology through direct linkages. No evidence for

	Estonia, Slovenia, Slovak Republic.		horizontal spillovers; Significant “crowding-out” effects for local firms.
Damijan et al. (2003b)	Czech Republic, Hungary, Poland, Bulgaria, Romania, Estonia, Latvia, Lithuania, Slovenia, Slovak Republic.	Dynamic system GMM approach for a panel of 8000 firms.	Positive direct effects from FDI, minor vertical spillovers. Larger importance of vertical vs. horizontal spillovers.
Javorcik Smarzyska and Spatareanu (2003)	Romania, 1998-2000	Intra-industry and spillovers through linkages	Intra-industry spillovers from wholly-owned affiliates; positive upstream spillovers from joint ventures but negative from wholly-owned.
Yudaeva et al. (2003)	Russia	Horizontal and vertical spillovers	Positive horizontal spillovers, but negative spillovers to indigenous firms vertically related to foreign affiliates. Regional stock of human capital enhances benefits from FDI to domestic firms.
Günther (2003)	Hungary	Experts interviews	Weak evidence for productivity spillovers due to large technology gap and low capital investments at indigenous firms.
Schoors and van der Tol (2002)	Hungary	Treatment effects model for a cross-section of firms in 39 sectors.	Positive horizontal spillovers to domestic firms, esp. in very open manufacturing sectors. Vertical spillovers more important than horizontal. Positive upstream spillovers.
Konings J. (2001)	Bulgaria, Romania, Poland	Fixed effects model in the GMM technique for firm-level panel data; productivity performance and spillovers	Negative spillovers to domestic firms in Bulgaria and Romania, and no spillovers to indigenous firms in Poland.
Evenett and Voicu (2001)	Czech Republic	Direct effects of receiving FDI on publicly-traded Czech firms	Sizeable benefits of FDI to recipient firms.
Kinoshita (2000)	Czech Republic	Firm-level panel data on Czech manufacturing firms	Positive horizontal spillovers in R&D intensive sectors
Djankov and Hoekmann (2000)	Czech Republic	Firm level data from a survey for the 1992-1997 period	Correlation between foreign ownership and higher TFP. Negative horizontal spillovers to indigenous firms.
Barrell and Holland (2000)	Hungary, Poland, Czech Republic	Sector-level panel data study for 11 manufacturing sectors	FDI increased labor productivity in most sectors, predominantly due to the intangible

			assets introduced by foreign firms.
Estrin et al. (1997)	Hungary, Czech Republic and Poland	Ten firms case studies	Weaker spillovers than generally anticipated. Positive supply network effects. Adverse competitive effects. Market and market share motivation for FDI found to be more spillovers enhancing than low-cost motivated entries.

Although there were attempts to analyze the spillovers effects on industry level, e.g. Barrel and Holland (2000), the succeeding studies focused on the firm level. The bulk of studies used a static analytical framework in which a production function was estimated on behalf of firm-level panel data. An impressive degree of care has been given to problems of dealing with short panels, unbalanced panels, endogeneity, the clustering of observations and its effects on measures of standard errors, and different ways of dealing with panel data (Lipsey 2005). With rising sophistication of econometric tools for empirical studies, the focus of interest shifts from statements of productivity supremacy of firms with foreign ownership versus indigenous firms and horizontal spillovers to the questions of materialization and importance of vertical spillovers, see inter alia Schoors and van der Tol (2002), Yudaeva et al. (2003), Javorcik Smarzynska and Spatareanu (2003), Javorcik Smarzynska (2004). Furthermore the empirical research follows the case of theoretical works that link the materialization of productivity spillovers on certain conditions, such as absorptive capacity of FDI receiving and indigenous firms in terms of capabilities of firms to learn and adopt the modern technologies brought in by foreign investors, as well as other location attributes such as institutional framework, endowment of human capital etc. (see Table 2.9.I for the relevant studies).

In spite of tremendous attention paid to productivity spillovers and more or less similar methodological approach, there still exists high ambivalence concerning the outcomes of the studies. While all of analyses find that higher productivity is associated with foreign capital, only several of them found some evidence for positive impact of the presence of foreign firm in the region and industry on purely domestically-owned firms in the same region and industry. Kinoshita (2000) found positive horizontal spillovers to domestic firms only in R&D intensive sectors, while Schoors and van der Tol (2002) suggest that positive spillovers can be expected foremost in very open manufacturing sectors. Yudaeva et al. (2003) argued that regional stock of human capital enhances benefits from FDI to domestic firms, which goes

along with a tier of succeeding studies suggesting different aspects of absorptive capacity to be precondition for productivity spillovers, see Kolasa (2007), Gorodnichenko et al. (2007) and Gersl et al. (2008).

Failing to find evidence for positive horizontal spillovers, the studies focused on the reverse effect from foreign direct investment, namely market stealing effect or “crowding out” of domestic firms. Damijan et al. (2003a) found significant “crowding out” of domestic firms in several CEE countries, while Kosov (2005) finds at least an “initial setback” in Czech manufacturing industries released by the entry of foreign companies.

Apart from difficulties the studies face in concern of data availability and quality, one of the most important omissions of studies might lie in the fact that they presume a linear relationship between spillovers and the host country’s level of development, in terms of human capital, institutions and income. Several recent studies provide an alternative perspective in analyses of productivity spillovers and suggest that curvilinear function between productivity spillovers and FDI destination country/firm characteristics, see Meyer and Sinani (2008) as well as Girma (2003).

2.10 Mechanisms of technology spillovers

The mechanisms of technology spillovers are comprehended as modalities of how technology spillovers materialize. Following specifications are foremost result of empirical studies.

Table 2.10.I: Mechanisms of productivity spillovers

Externalities	Linkages	Competition
Demonstration	Backward linkages	Intensified competition
Labor force fluctuation	Forward linkages	due to entry of foreign
	Co-operations	firms

2.10.1 Demonstration

Through their operations foreign firms in FDI receiving country demonstrate their superior technology in different business fields as marketing, supply or distribution. Such procedures can be observed and imitated by domestic firms. In this way it comes to technology transfer

through *demonstration effects* (Blomström and Kokko 1993; Csaki 1998) or *contagion effects* (Blomström and Kokko 1996). Demonstration acts as a typical technology spillover, still it emerges tacitly, without knowledge of technology superior firm and without any payment obligations by technology coping firm¹⁰.

Domestic firms can observe and imitate the business operations of foreign firms such as procedures, methods, techniques, and so on, as well as a finished product. In the first case we are talking about *observation of the action* (Grossman and Helpman 1997, p. 16) or *learning-by-watching* (Burger 1998) and in the second case about *inspection of a product* (Grossman and Helpman 1997) or *reverse engineering* (Mohnen 1996).

Technology spillovers through demonstration are basically possible also without presence of foreign firms in domestic markets. However, foreign firms on site reduce the information costs for domestic firms. This holds especially for learning-by-watching that is as difficult as larger the geographical distance to foreign firms. Therefore we can say that multinational companies are a catalyst for dispersion of technology in FDI receiving countries (Dunning 1993; Mansfield and Romeo 1980; Blomström et al. 1999).

There are several case studies where demonstration and contagion effects of FDI are discussed explicitly. Tilton (1971), in a study of the semiconductor industry, points at the importance of new TNCs in introducing U.S. innovations to the European countries. Lake (1979), also examining the semiconductor industry, argues that affiliates of U.S. TNCs have been more active than local firms in the diffusion of new technology in Great Britain. Mansfield and Romeo (1980) show that the technologies transferred to affiliates are younger than those sold to outsiders, and that there are cases where the affiliate's technology imports have induced local competitors to imitate their behavior. Riedel (1975), referring to his own earlier studies, claims more explicitly that horizontal demonstration effects from the operations of TNCs were an important force behind the development of the manufacturing sector in Hong Kong in the 1960s. In a similar vein, Swan (1973) suggests that multinationals are important not only for the diffusion of the specific technologies they employ, but also strengthen international communication channels, which makes demonstration across international borders possible.

¹⁰ Blomström and Kokko (1996) give an overview of empirical studies on technology spillovers through demonstration.

2.10.2 Mobility of labor force

Modern technologies have been transferred, not only in the form of machinery, equipment, patent rights, and expatriate managers and technicians, but is usually transferred tacitly, in form of knowledge and know-how. Training of the local employees by a foreign affiliate is an often channel for transfer of such know-how. Most levels of employees are affected, from simple manufacturing operatives through supervisors to advanced technicians and top managers. Depending on the skills needed, types of training range from on-the-job training to seminars and more formal schooling to overseas education, also at the parent company.

While at the beginning of operations abroad the bulk of leading positions in a foreign affiliate are occupied by expatriates from parent company, eventually local labor force takes over higher management posts. The increase in local share is supported by parent company since it saves costs. Local staff is qualified for such high position through different education and training programs (Dunning 1993; Fosfuri et al. 2001). This contribution to human capital building in host economy can be realized in or outside foreign affiliates or abroad beneath holding companies. When employees educated as described leave foreign firm for a domestic one or establishes a new company it transfers technology in form of soft technology. In this way, a technology transfer takes place (Blomström and Kokko 1996; Burger 1998; Dunning 1993; Enderwick 1996; Estrin et al. 1997; Fosfuri et al 2001; Grossman and Helpman 1997; McMillan 1996; Zukowska-Gagelmann 2001). This transfer takes place tacitly and without any payment obligations of technology receiving companies. Empirical studies confirm the thesis that foreign affiliates contribute to human capital building in FDI receiving economies, see e.g. Estrin et al. (1997), ILO (1984).

Many empirical studies on spillovers through labor mobility analyze developing countries. Gerschenberg (1987) examines TNCs and the training and spread of managerial skills in Kenya. He finds that TNCs offer more training of various sorts to their managers than private local firms do, although not more than joint ventures or public firms. Managers also move from TNCs to other firms and contribute to the diffusion of know-how. In a study on Latin America, Katz (1987) finds out that managers of locally owned firms often started their careers and were trained in TNC affiliates. Similarly, Yoshihara (1988) emphasizes the importance of training in foreign companies (and overseas education) for Chinese-owned firms in South-East Asia. In a study of technology transfer to Hong Kong, Chen (1983)

emphasizes training of operatives and even claims that “*the major contribution of foreign firms in Hong Kong manufacturing is not so much the production of new techniques and products but the training of workers at various levels*”. Hill (1982) also identifies similar cases in the Philippine appliance and motor cycle industries.

Another important aspect in the discussion on human capital and TNCs is related to the R&D efforts undertaken by the TNCs. Although at a small scale compared to their home countries, TNCs do undertake some R&D activities also in their host countries. Comparing the levels of foreign affiliates’ R&D activities with those of domestic countries, Fairchild and Sosin (1986) conclude that foreign firms in Latin America exhibit internal local R&D efforts and that their total expenditures on research are very similar to those of domestic firms. Chapter 6 of the present study shows how Czech automotive cluster became of the Europe’s leading locations for R&D projects in vehicle production.

It seems safe to claim that TNCs contribute to human capital stock in host countries. Educated workers are carrier of the knowledge and information they gained, so that in case of leaving the firm they take this knowledge with them. Therefore foreign firms try to reduce fluctuation of their staff posing barriers for leaving the firm such as higher salaries, better career chances, minimum working periods in contracts, and so on (Enderwick 1996; Burger 1998; Blomström and Kokko 1996; Blomström et al. 1999; Fosfuri et al. 2001).

2.10.3 Linkages as source of technology spillovers

In contrast to productivity spillovers resulting from externalities from demonstration and labor fluctuation, technology transfer takes also place directly in contacts between technologically superior foreign affiliates and domestic firms. Borrowing a definition by Lall (1980, p. 204) the term “linkage” is used to denote “*direct relationships established by firms in complementary activities which are external to ‘pure’ market transactions*”. Contacts between firms and their suppliers are called *backward linkages*, while contacts and cooperations with the buyers or distributors are denominated as *forward linkages*. The spillovers occur when local firms benefit from the knowledge and information gathered through such “relationships”, without incurring a cost that exhausts the whole gain from the improvement. Still, the existence of linkages does not imply necessarily technology spillovers, but there is a large scope for doubts in ability of foreign firms to charge and extract

the full value of productivity increase in local firms resulting from obtained information. Günther (2002) distinguishes between productivity spillovers as externalities and productivity spillovers as result of linkages between foreign and domestic firms.

Table 2.10.3.1 Externalities vs. linkage spillovers

	<i>Externalities</i>	<i>Linkage spillovers</i>
<i>Type of technology</i>	Soft technology	Soft and hard technology
<i>Payment</i>	No	No or less than full market price
<i>Way of transfer</i>	Anonym; by foreign firm not controllable	Open and direct

Source: Günther (2002)

2.10.3.1 Backward Linkages

Depending on the dominant motivation for foreign direct investment, most multinational companies provide their foreign affiliates at least initially with materials and intermediate goods from home or another developed country. In order to save costs there is a permanent search for appropriate domestic suppliers. Thereby, foreign firms are confronted, especially in less developed countries with inadequate quality of local intermediate goods. The foreign affiliates often try to improve processes and raise product quality of potential suppliers involving in a kind of cooperation or “extra-market-linkages” (Lall 1990) with chosen domestic firms. Furthermore, foreign firms might transfer directly some soft or hard technology to domestic firms in order to provide a qualitative and quantitative adequate level of intermediates. Since domestic firms do not pay anything or at least not the full market price for the transferred technology we are talking about technology spillovers through linkages¹¹. In an earlier study, Lall (1980) identifies some of the “complementary activities” through which foreign affiliates may trigger some spillovers, when they:

- help prospective suppliers (both domestic and foreign) to set up production facilities;
- provide technical assistance or information to raise the quality of suppliers’ products or to facilitate innovations,
- provide or assist in purchasing of raw materials and intermediaries,

¹¹ An overview of literature on productivity spillovers through linkages was given by Blomström (1991), Blomström and Kokko (1996) and Dunning (1993).

- provide training and help in management and organization, and
- assist suppliers to diversify by finding additional customers.

Additionally, we can expect some productivity increases as suppliers are instructed by TNCs to meet higher standards of quality, reliability, and speed of delivery. For example, Brash (1966), studying the impact of General Motors on its local suppliers in Australia, emphasizes the importance of the TNCs' stricter quality control, which also had an impact on the suppliers' other operations. Katz (1969, p. 154) reports that foreign TNCs operating in Argentina "*forced their domestic suppliers to adopt productive processes and techniques used by the suppliers of their main firms in their country of origin*". Similarly, Watanabe (1983) notes complaints from small local producers in the Philippines about the large foreign firms' tough requirements on both product characteristics and prices.

As far as technical linkages are concerned, Lall (1980) finds that there were large variations depending on the size of the supplier and technical similarity between the supplier and the principal company. *Low technical linkages*, meaning quality control and communication of information about input specifications, were found for all types of suppliers, but quality control was more important in contacts with small subcontractors. *Medium technical linkages*, including joint development of component designs and more comprehensive technical assistance, were more important for large suppliers of complex products with technology similar to that of the truck firms. *High technical linkages* also occurred in some cases where research and development work were undertaken to create entirely new designs that would fit the capabilities of the suppliers. Summarizing his findings, Lall maintains that technologically dissimilar suppliers gain mainly from having assured markets and information about the future plans of their customers. Technologically similar large suppliers have additional strong benefits from technical linkages. Technologically similar small suppliers may face a trade-off between benefits and cost, since the dependence on the large buyer translates into a weak bargaining position; yet, on balance, the benefits are likely to outweigh the disadvantages.

Examining the Philippine appliances and motor cycle industries, Hill (1982) presents results that show significantly weaker inter-firm linkages than those presented by Lall (1980). Author explains this by more liberal import policies that reduce local content, by the small market that makes much production economically unviable, and by the fact that the assembler

character of the principal firms makes them incapable of offering technical assistance to suppliers.

The contact between foreign firms and potential domestic suppliers is necessary for emergence of productivity spillovers through linkages. Therefore we suppose that the possibility for productivity spillovers is higher as higher the number of domestic suppliers to foreign firms. This implies at the same time a higher level of integration of foreign firms in local economy.

Several studies, see e.g. Watanabe (1983) and UNCTC (1981), emphasize the importance of local content for backward linkages. Reuber et al. (1973) show in a comprehensive survey of TNC affiliates in developing countries systematic differences in local purchases depending on the affiliate's market orientation, the parent's nationality, and the host country. Local-market oriented affiliates purchased more locally than did export-oriented affiliates (perhaps because import licenses are easier to obtain for exporters); European TNCs relied more on local firms than U.S. or Japanese firms (perhaps because they are generally older and have already built up local supplier networks); and affiliates in Latin America and India purchased more locally produced inputs than affiliates in the Far East (probably because of differences in local content requirements). In addition to this, the technical capability of potential local suppliers seems to be another important factor. Furthermore, authors expect the share of local content to increase notably over time, also for export-oriented affiliates. McAleese and McDonald (1978) strengthened this expectation showing in a study of Irish manufacturing 1952 – 1974 that local purchases of inputs tend to increase as the TNCs affiliates mature. This can be explained by several factors: further production processing stages are added over time, the autonomous growth of the manufacturing sector brings up new suppliers, and some MNC take deliberate action to attract and develop local suppliers. This last point was confirmed also by other studies, e.g. Dunning (1958, 1980) and Lim and Pang (1982).

Aitken and Harrison (1999), who examine Venezuelan manufacturing between 1976 and 1989, present results that contradict those from studies above. They conclude that the effect of foreign investment on the productivity of upstream local firms is generally negative. They elaborate that foreign firms divert demand for domestic products to imported inputs, which means that the local supplier firms are not able to benefit from potential economies of scale.

2.10.3.2 Forward linkages

Technology transfer takes also place between foreign firms and their distributors or buyers (Burger 1998; Dunning 1993; UNCTAD 1999). Together with products foreign firms as providers might transfer also the instruction for optimal use of those consumption or investment goods. If those instructions go beyond the contract and no further costs arise for domestic firms then we are talking about technology spillovers through forward linkages.

Rational for this kind of support is usually the interest of foreign firms to provide a stable demand for their products. Technological support is a part of a broader marketing strategy aimed at building long-term commitment and preference of buyers and in this way excluding the rivals (Bruhn and Homburg 1999; Dittrich 2000). In already mentioned studies of Dunning (1958), Lall (1980), Reuber et al. (1973) und McAleese and McDonald (1978) find forward linkages as mechanism for productivity spillovers much attention; new studies, such as Blomström (1991) and Blomström and Kokko (1996), emphasize that technology spillovers through forward linkages are especially important in high-tech and computer industries. Aitken and Harrison (1999) argue that spillovers from forward linkages seem to be important in most industries – they even conclude that the downstream effects of foreign direct investment are generally more beneficial to domestic firms than the upstream effects.

Preconditions for productivity spillovers through forward linkages are existence of potential domestic buyers or foreign affiliates' products. Some of the host country characteristics that may influence the extent of linkages – and spillovers – are market size, local content regulations, and the size and technological capability of local firms (Kokko 1992). Furthermore, as foreign affiliates integrate more into local economy, skill level of local firms grows, new suppliers are identified and local content increases. The linkages with local firms are likely to increase.

2.10.4 Co-operations between foreign and domestic firms

Besides business co-operations in form of backward and forward linkages, there exist a number of different forms of co-operations between firms aimed at realizing different projects beyond capital investment and business relations. Several terms denote in the literature co-

operations: strategic alliances, networks, value creation partnership (Hopfenbeck 1996; Sydow 1992).

Technology spillovers take place when foreign affiliates transfer soft or hard technology to domestic co-operative partners in expectation of own advantages, and the transferred technology brings productivity improvements in domestic firms. At the same time technology receiver do not pay any or at least not the full price for technology transferred. The advantage for technology superior foreign firms might be calculative or speculative depending on defined aims of co-operation. Anyway, such transfer of knowledge represents technology spillovers through linkages.

Co-operations between firms might take form of permanent organizations and networks or temporary projects, e.g. in field research and development. Thereby is necessary for appearance of productivity spillovers the willingness of foreign affiliates to transfer the technology to domestic firms in order to achieve defined aims of co-operations.

2.10.5 Technology spillovers and competition

It has been claimed that the entry of a TNC raises the level of competition in the host country's industry and puts pressure on local firms, that are forced to introduce new technologies or improve their efficiency to avoid losing market shares or closing the business. The general increase in productivity that follows is considered to be major spillover effect of FDI. Some author have hypothesized that these are the most important influences of TNCs on local firms, see e.g. Blomström (1986).

The entry of TNCs into a kind of monopolistic industry is likely to increase the level of competition and force existing firms to become more efficient. Foreign entry may, of course, also lead to a fall in the number of firms in the industry if the least efficient local firms are forced out of business. This raises fears that foreign affiliates may outcompete all local firms and establish monopolies that are even worse than the domestic oligopolies they replace: in addition to restricting competition, there are concerns that TNC monopolies may also repatriate profits and avoid taxation through transfer pricing. However, Caves (1971) argues that the general outcome is that competition becomes more fierce, because the entry of TNC affiliates stir up the established patterns of "gentlemanly competition". Hence, Caves (1971)

holds that: “... *whatever the market structure that results from the influence of direct investment, it can be argued that entry by a foreign subsidiary is likely to produce more active rivalries behavior and improvement in market performance than would a domestic entry at the same initial scale*”. A related argument is that the resulting increase in competition may be more effective in inducing technological change and productivity improvements than profit incentives, since: *...threats of deterioration or actual deterioration from some previous state are more powerful attention-focusing devices than are vague possibilities for improvements.*” (Rosenberg 1976, p. 124).

The potential productivity improvements from these types of reactions are probably larger in the less developed countries than elsewhere, since the initial inefficiencies are often greater. On the other hand, local firms in the less developed countries may be too weak to mount a competitive response to foreign entry, whereas locals in industrialized host countries can often be expected to reply competitively. Various defensive corporate agreements, such as amalgamations among local firms or cooperative ventures with other foreign firms, may improve the local firms’ competitiveness, even in developing countries (Lall 1979; Evans 1977), but there are no direct cross-country comparisons available, and there are not enough case studies for more comprehensive conclusions. What exactly the reaction is – and how important the spillovers are – is likely to depend on the initial conditions in the market, and how much of an impact MNC entry makes on concentration and competition (Kokko 1992).

Lall (1978) hypothesizes that it is plausible that TNCs speed up the natural concentration process in LDCs, or that the weakness of local competitors allows TNCs to achieve a higher degree of market dominance than in developed countries. Lall (1979) proceeds to argue that the level of concentration probably falls in the short run following TNC entry, as the affiliate adds to the number of firms in the industry, but that this may be reversed in the long run. The TNCs may buy out local firms or force them out of business, their success may force local firms to fusions and amalgamations, or they may be more skilled as lobbyist than others, thus adding to entry barriers and protection.

The assumption implicit in much of the discussion above is that competition improves efficiency and welfare, but there are cases where it must not necessarily be that way. Firstly, economies of scale are important determinant of industrial productivity. To the extent that foreign entry increases concentration in relatively small national industries – particularly

those where some type of imperfections have initially influenced market structure – resource allocation and efficiency may well improve from the increase in average firm size. Whether this effect is stronger than that from presumably reduced competition depends on market characteristics and trade policy. Secondly, focusing more closely on technology, there is the classic “Schumpeterian Dilemma” of weighting the static allocative efficiency of competitive markets against the supposed dynamic efficiency of monopolistic and oligopolistic firms. The rate of technical progress may perhaps be higher in concentrated markets, since firms there have internally generated profits to use for R&D, and are generally larger and more able to enjoy economies of scale in R&D. It is also possible that market structure has some impact on what the R&D efforts aim to achieve.

Generally, I would say that the most case studies in this field illustrate situations where entry of TNCs increases competition in host industries. TNCs’ entry force local firms to improve resource allocation and often also to upgrade technology. Looking at the industry structure, it seems that TNCs enter mainly into industries where barriers to entry and concentration are relatively high, and initially add to the number of firms in the market. In the long run, TNCs may contribute to some increase in concentration, but efficiency may still benefit, particularly if initial distortions had preserved inefficient producers and if protection does not guarantee an easy life also for the TNC affiliate. Still, it is not possible to disregard the risk that TNC entry into developing countries replaces local production and forces local firms out of business, rather than forcing them to become more efficient. The study of the Czech automotive industry shows a larger number of competitors after the entry of Volkswagen Group on this market by acquiring of Skoda. At the same time, the impact of the hundreds of foreign car components suppliers is less beneficial for domestically-owned companies in the same segment.

In practice, it is difficult to distinguish between learning and competition effects on productivity. Probably the most valuable information from case studies may be to show how local firms respond to increased competition in the short run, before imitation takes place. The immediate local reaction may be to merely enforce stricter or more cost-conscious management and motivate employees to work harder, in order to reduce slack or improve X-efficiency. It is possible that this seemingly simple response may make a more substantial contribution to productivity than improvements in resource allocation, see the works of Leibenstein (1966, 1980), Pack (1974) and Page (1980).

2.11 Firm-specific factors relevant for technology spillovers

Several factors are important for appearance of technology spillovers both on the side of foreign affiliates and of domestic firms.

2.11.1 Foreign affiliates and modern technology

In spite of all “superiority” of technology transferred through foreign direct investment compared to joint ventures and licensing, it is still a question how modern this technology is. Behrman and Wallender (1976), Mansfield et al. (1979) and Mansfield and Romeo (1980) hold a view that firm intern transferred technology is newer than that transferred via joint ventures and licenses. Das (1987) shows theoretically that even in the presence of positive externalities to the benefits of domestic firms, the transfer of “better technology” is still beneficial for multinational companies. Numerous empirical studies find evidence of innovative activities of multinational companies, but also argue that those are located mostly in high developed industrialized countries or in subsidiaries in high developed locations (Dunning 1993; Blomström and Kokko 1996; Cantwell 1995; Inzelt 1998; UNCTAD 1999).

Supply of modern technology through foreign affiliates depends on intern, corporate specific factors. It is not only the technology transfer through linkage-spillovers that are controlled for but also in the case of technology dispersion through externalities is partially controlled by multinational companies, that at least through protection of intellectual property and by hiring expatriates from parent company for the top management or especially confidential technical posts. Depending on those in the literature emphasized as especially important factors can foreign affiliates have large differences in potential for technology spillovers.

The technology supply by foreign firms correlates to some with the *home country of transnational companies* (Dunning 1993; Nagy 1997). By its philosophy can enterprises be distinguished as open and closed vis-à-vis its environment. Enterprises that follow an open philosophy have a higher potential for technology transfer in its environment, since they establish linkages easier.

Furthermore, the *form of direct investment* can affect the potential for productivity spillovers. Foreign affiliates enter a foreign market either through acquiring of an existing firm (acquisition) or by establishing a new firm (greenfield investment). In case of greenfield investment is the integration into local economy more difficult since the linkages network has to be established yet. In case of acquisitions, this network already exists and can be easier further enriched (Bobeva 1997; Lorentzen 1998; Quaisser 1995; Radosevic and Dyker 1997). Therefore it is realistic to suppose that foreign acquisitions have higher potential for technology transfer than greenfield investment. On the other hand, the potential for technology transfer through greenfield investments rises with better integration into local economies (Dunning 1993; Blomström and Kokko 1996).

In the literature is also the *relationship between foreign affiliates and their parent companies* often seen as a relevant factor for technology transfer. Decisions and operations considering new technology and know-how in other business function are very often centralized in parent companies or in a few affiliates in a few developed countries. Therefore we can expect the potential for technology transfer to be higher as foreign affiliates are more *independent* from the holding and as the business functions are more decentralized in the corporation as a whole. This implies also that foreign affiliates have as wide as possible spectrum of business functions. Therefore we suppose that the higher the number of business function in foreign affiliates the higher is their potential for technology transfer. This holds especially for research and development where enterprises that locally develop own technologies are expected to have the highest potential for technology spillovers.

Cantwell and Narula (2001) put conjecture that nature of externalities from FDI depends on its *motivation* for locating in the host region. Traditionally FDI has chiefly been characterized as being motivated by the TNC's desire to exploit its firm-specific assets abroad (Hymer 1976). Recently, another general motive for undertaking FDI appears to be identified: acquisition of technological knowledge residing in the host country or technology sourcing. Fosfuri and Motta (1999) label such TNCs "*multinationals without advantages*" and argue that knowledge gained by locating close to market leaders can then easily be transferred to all subsidiaries of the multinational firm. Wesson (1999) presents a game theoretic model in which a firm may undertake FDI in order to secure access to certain types of valuable assets. But he also shows that asset-seeking and asset-exploiting motivations are not mutually exclusive.

The existence of technology sourcing FDI is empirically established by Kogut and Chang (1991) and Neven and Siotis (1996), among others. However, to the best of my knowledge, the paper by Driffield and Love (2001) is the only one that tests if the spillovers implications of technology sourcing FDI are different from those of technology exploiting FDI. Using industry-aggregated FDI flows to the UK, Driffield and Love (2001) conclude that technology-sourcing FDI has detrimental effects on the domestic sector's productivity trajectory.

2.11.2 Demand for technology by domestic firms

Similar as the supply of modern technology, the demand for it by domestic firms is not trivial. The search, implementation and adoption of extern technology is an active work for domestic firms.

Corporate philosophy determines the acquisition of new technology in the local firms too. A closed philosophy leads to a “not-invented-here-effect” (Reinhard 2001), that is to a skeptic towards innovations made outside the firm. At the same time should an open corporate philosophy enhance the potential for productivity spillovers.

More important in the case of transition countries however, is the existence of physical and financial resources for adoption and implementation of new technology.

However, as we will see in Chapter 5, the decisive factor for appearance of productivity spillovers is the existence of some minimum level of know-how necessary to identify, adopt and implement some new technology. This know-how is in the literature denoted as absorptive capacity. As higher this capacity as easier and faster is the technology transfer to domestic firms.

2.12 Institutional and legal framework for technology spillovers

2.12.1 Macroeconomic framework

Precondition for the emergence of productivity spillovers are several macroeconomic factors in the FDI receiving economy, the so called “*econstructural dimensions*” (Dunning 1993). Foreign firms are **superior** in their technology and know-how, that results in a higher productivity level of foreign firms relative to the average productivity of domestic firms. Still domestic firms have to be “compatible” with foreign firms, that means that domestic firm must be able to recognize, learn about and employ new technologies (Cohen and Levinthal 1990). This is often called technology **absorption capacity** and is basic precondition for an international technology transfer to take place via productivity spillovers from foreign direct investment (Avgeris 1994; Lall 1992; Berger 1981; Braun 1995).

As far as policy implications for FDI host countries are concerned, the key question is what developing host countries can do to leverage the expansion of inward FDI. In terms of enhancing the positive impact of such FDI, they need to consider the full range of policies that can influence the behavior of foreign affiliates, and their interaction with the local business environment. This requires taking into account the specific characteristics of different industries and activities in designing a strategy to attract desired kinds of FDI. In addition, it is important to promote the amount and quality of linkages between foreign affiliates and domestic firms.

Here are meant foremost government programs and measures that aim to increase the benefits from foreign direct investment for the receiving economy. Such programs are:

- subsidizing foreign firms in high-tech industries
- enhancement of absorptive capacity of domestic firms (through e.g. training and education programs, investment support,...)
- supporting the cooperation between foreign and domestic companies

Besides these direct factors there are also a number of policies that affect the technology spillovers, such as education, support of research and development etc. (Blomström et al. 1999; Dunning 1993).

Table 2.12.1.1: Structural and institutional change indicators in 2007

	Czech Republic	Hungary	Poland	Romania	Bulgaria
Private sector share in GDP (%)	80%	80%	75%	70%	75%
Share of trade in GDP (%)	136,9%	134,7%	73,2%	74,4%	119,3%
Internet users per 100 inhabitants	43,2	41,9	42	56	24,9
EBRD index* of enterprise reform	3,3	3,7	3,7	2,7	2,7
EBRD index* of banking sector reform	4,0	4,0	3,7	3,3	3,7
EBRD index* of infrastructure reform	3,3	3,7	3,3	3,3	3,0

Source: www.ebrd.com/country/sectors/econo/stats/index.htm

* Index scores from 1 = little progress to 4+ = standards and performance typical of advanced industrial economies.

2.12.2 Legal framework

Decisive part of foreign direct investment in Central and Eastern European countries is associated with privatizations of state-owned enterprises and facilities.

Mass privatization has been promoted as an opportunity to redistribute the wealth of the economy to its citizens in a “fair” way. However, the organization of voucher-based auction is a complex task and can result in dispersed ownership and no effective control. For foreign investors, such schemes offer opportunities to acquire local firms only after the privatization has been completed. Privatization through direct sale to foreigners might have been faster and generate revenues for the government budget. However, it is often disliked since it does not create widespread local ownership and additionally firms may be sold beyond market value due to information asymmetries (Meyer 1998, p. 18).

The actual privatization process has often been a mix of many methods. Privatization processes in Eastern Europe are commonly divided into “small scale” (comprises the

privatization of small state-owned or cooperative enterprises mainly in the field of trade and other services, premises and land) and “large scale” privatization (transfer to private ownership of large public enterprises in industry, transport, construction, banking, insurance, wholesaling etc.) In 1989 large enterprises accounted for almost 80% of the national product in these countries. The process of large-scale privatization went along with the establishment of financial markets in the region.

The comprehensive packages of privatization legislation were passed in most CEECs countries already in early 1990s. In the Czech Republic, the privatization through voucher scheme was implemented. In Hungary, small scale privatization took form of spontaneous privatization in that insiders took control of enterprises. By 1995, Hungary moved to privatization of telecommunications and other network operating companies with focus on sales to foreign investors. The Hungarian success story inspired other countries to promote direct privatization through foreign investment (e.g. Estonia, Croatia). Due to political conflicts, Poland went on with large privatization very slowly, till 1996, as a voucher scheme was instituted that gave designated investment funds a central role.

Between privatization processes and foreign capital flows there is a feedback relationship in Eastern Europe. Foreign investment imparts greater momentum to privatization processes (keeping in mind low stock of private capital) and warrant deeper consequent changes. Through acquisition by privatization, investors can instantly acquire market shares with local brand names and distribution networks. Although the technology and existing capital stock has mostly been of minor value, firms have possessed valuable team-embedded knowledge such as R&D and local networking teams (Meyer 1998). At the same time, institutional change through privatization creates normal conditions for the operations of foreign enterprises. Therefore, the pace of privatization acted as an indicator for transformation progress.

Table 2.12.2.I: EBRD index of privatization progress*

	1989	1995	2000	2005	2008
Small – scale privatization					
Czech Republic	1,0	4,0	4,3	4,3	4,3
Hungary	1,0	3,7	4,3	4,3	4,3
Poland	2,0	4,0	4,3	4,3	4,3
Romania	1,0	2,7	3,7	3,7	3,7
Bulgaria	1,0	3,0	3,7	3,7	4,0
Large-scale privatization					
Czech Republic	1,0	4,0	4,0	4,0	4,0
Hungary	1,0	4,0	4,0	4,0	4,0
Poland	1,0	3,0	3,3	3,3	3,3
Romania	1,0	2,0	3,0	3,7	3,7
Bulgaria	1,0	2,0	3,7	4,0	4,0

Source: www.ebrd.com/country/sectors/econo/stats/index.htm

* The values range from 1=little private ownership to 4+ = more than 75 per cent of enterprise assets in private ownership with effective corporate governance.

Generally, legal regulations relevant for foreign direct investment and eventual technology spillovers are regulations on foreign investments and protection of property rights. Recent regulatory changes regarding foreign direct investments took a very liberal stance toward foreign capital and pose less obstacles for foreign investment. Some restrictions for foreign investments in certain industries still exist. Often are these laws also coupled with some supranational agreements such as memberships in international organizations or agreements. The potential for technology spillovers is expected to grow with less legal restrictions for foreign investment (Blomström et al. 1999).

Table 2.12.2.II: National regulatory changes 1994 – 2006

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
<i>Number of countries that introduced changes</i>	49	63	66	76	60	65	70	71	72	82	103	93	93
<i>Number of regulatory changes</i>	110	112	114	150	145	139	150	207	246	242	270	205	184
<i>More favorable to FDI</i>	108	106	98	134	136	130	147	193	234	218	234	164	147
<i>Less favorable to FDI</i>	2	6	16	16	9	9	3	14	12	24	36	41	37

Source: UNCTAD (2007, p.14)

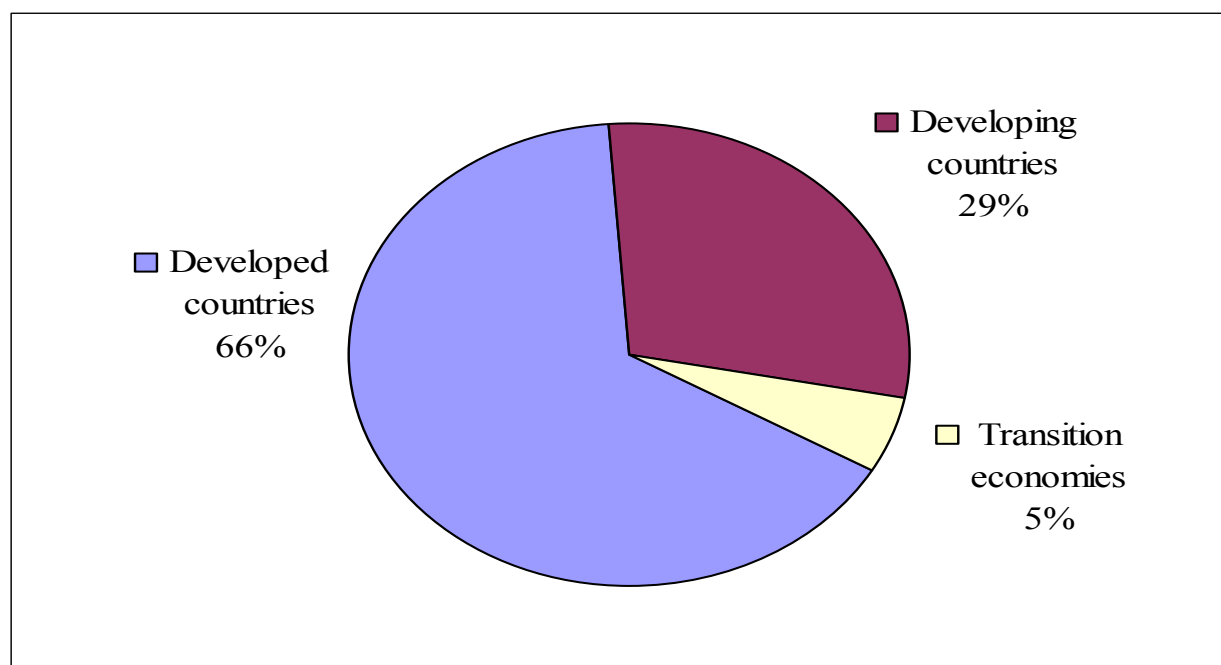
The character of technology as public good is limited through property rights legislature and thus the potential for productivity spillovers also. On the other hand, there are no technology spillovers without superior technology of foreign firms. Those are however more willing to invest in an economy where property rights are protected (Schwed 1998; Smid 1998; Lee and Mansfield 1996; Mansfield 1994; Smarzynska 1999). Therefore it is expected that in spite of some “losses” of externality spillovers, protection of intellectual property rights has positive impact on technology spillovers.

Not only FDI regulation affects FDI. Weak political, institutional and legal framework deter transformation progress and economic development. *“Missing are the appropriate structured agencies, effective courts, the customary practice of enforcing private rights, the professionals, the scholarly and judicial opinion, and the web of ancillary institutions that give substance to written law”* (Murrell 1996, p. 34). The weak legal institutions discourage the use of the courts to settle disputes and permit corruption. Western business operation is further inhibited by different business ethics that for instance permit the breaking of a law that is considered non-sensible (Meyer 1998). Reform of the legal system has made substantial progress in all Central and Eastern European countries, especially in the new EU-member states, enforced by required reforms in the wake of EU accession. Nevertheless, some serious deficiencies in legal structures and law enforcement remain.

3 Foreign direct investment in Central and Eastern Europe

Inflows of foreign direct investment rose both in developed and developing countries. In 2006, the FDI inflows in developed countries rose by a rate of 45 % to reach \$857 billion, the inflows in developing countries grew “only” by 21 % but still reaching its highest level ever with \$379 billion in 2006. Transition economies of Central, East and South East Europe and CIS evidenced the highest growth of inward foreign direct investment (a 68% increase over those in 2005) and received \$69 billion. In spite of such strong growth, the share of transition countries in global inflows and stock of foreign direct investment remains relative low.

Chart 3.I: FDI global inward flows in 2006

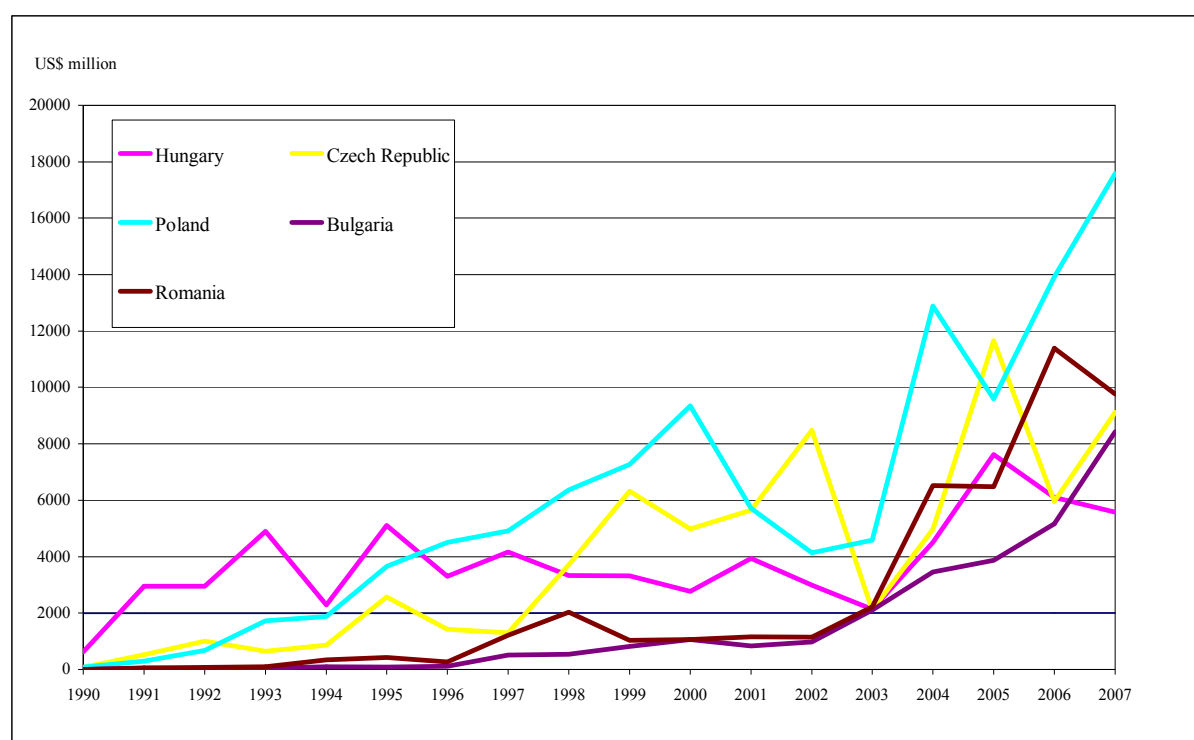


Source: Based on UNCTAD statistics, <http://stats.unctad.org/FDI>

The region's share in global FDI flows remained under 1 per cent until 1990. Parallel to ongoing transformation and integration into world economy, the massive FDI inflows to a few transition economies (foremost Hungary and the Czech Republic) made that share increase almost every year, and exceed 4 per cent by 1995. By 2000, it declined to 1.8 per cent, just to climb again in 2001 to 3.7 per cent. This fluctuation was due to more rapid increase of FDI inflows towards developed countries and the subsequent decline thereafter against a steadier but more constant increase in the region (UNCTAD 2003). Since some big countries as the Russian Federation and Ukraine still received little FDI compared to their size, the share of the region in global FDI is smaller than the relative size of the region in terms of territory and

population (5.2 per cent). While smaller economies as Hungary, the Czech Republic, Poland, the Slovak Republic and the Baltic states received the bulk of FDI already in 1990, FDI flows to CIS countries intensified only by the end of 1990s. In 2006, inward FDI to the region's largest economy, the Russian Federation, more than doubled and reached \$29 billion (42% of region's FDI inflows). Big privatization projects and resource – seeking foreign direct investment, as well as market – seeking FDI in big countries and new EU member states make safe to expect continuous growth of inward FDI flows to the region.

Chart 3. II: Inflows of FDI in selected Eastern European Countries 1990 – 2007



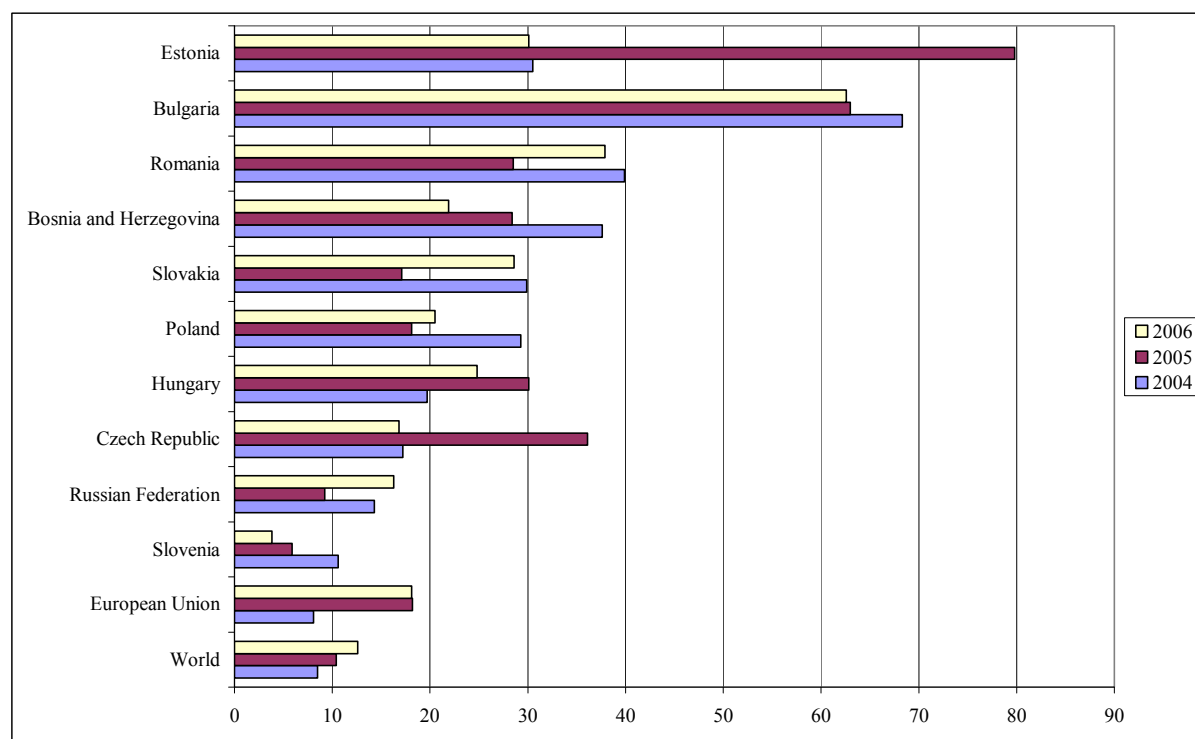
Source: Based on UNCTAD statistics, <http://stats.unctad.org/FDI>

In the first half of 1990s, Hungary was the most successful country of the region in attracting foreign direct investment. Annual inflows to this country were higher than inflows to much larger economies like Poland and the Russian Federation. Hungary opened up its economy to foreign investors ahead of others and privatized former state-owned facilities through mainly foreign takeovers. In terms of FDI per capita, Estonia came close to Hungary. The very liberal economic policy course in this country made foreign investment easy. In the second half of the 1990s, larger countries caught up: Poland surpassed Hungary in terms of the amount of FDI inflows in 1996, and the Czech Republic in 1998. The larger size of these economies attracted market – seeking investment. Furthermore, success stories as those of Hungary and

the Czech Republic made attitude toward foreign investors more positive in other transition countries. The start of privatization by sales to foreigners and a more friendly FDI policy framework contributed to high FDI inflows in the past few years. Foreign direct investment followed the reforms in privatization and FDI policy and shift further to the East. So, in 2000 and 2001 the largest recipients of FDI in absolute terms were Poland, the Czech Republic, the Russian Federation, Hungary and Slovakia. In 2006, the Russian Federation, Romania, Kazakhstan, Ukraine and Bulgaria accounted for 82% of the total inflows to the region (UNCTAD 2007).

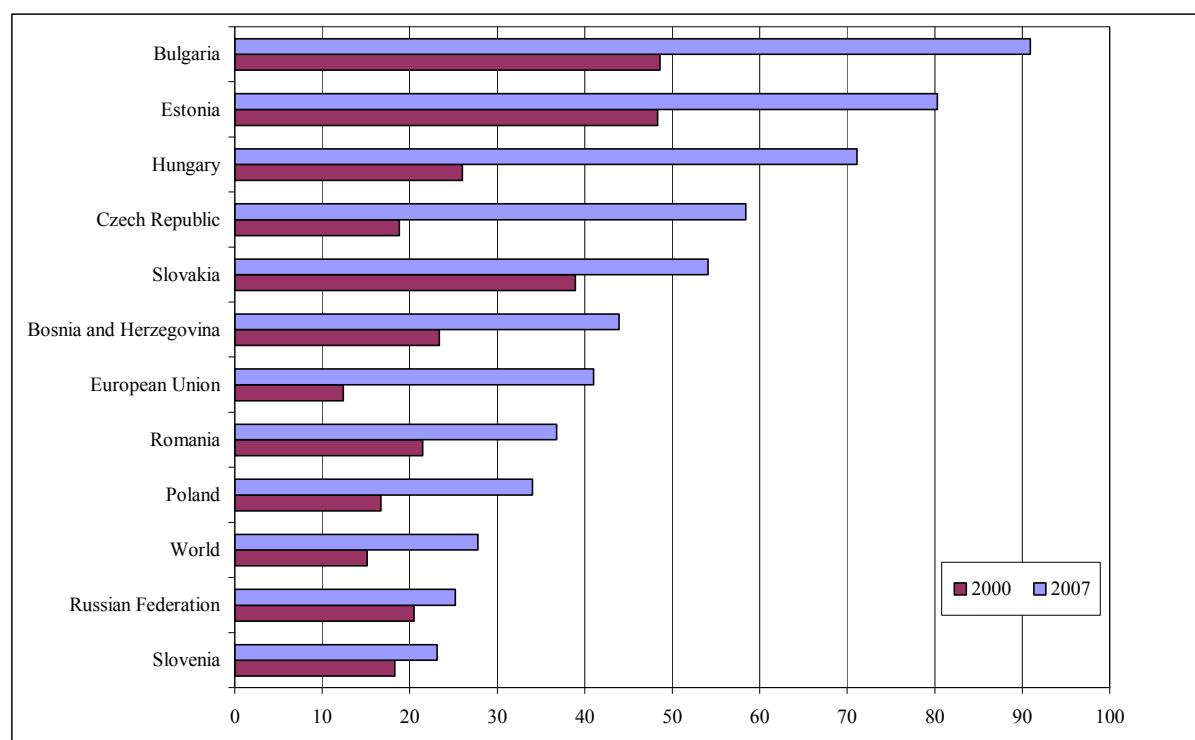
Although small in absolute terms, foreign direct investments still play an important role in relative terms, especially in small economies. In 2006, in 12 transition countries, FDI inflows remained under \$1 billion, but in small economies such as Montenegro or Bosnia and Herzegovina, they are still considerable in relation to the size of the economy.

Chart 3.III: FDI flows as percentage of gross fixed capital formation 2004 – 2006



Source: Based on UNCTAD statistics, <http://stats.unctad.org/FDI>

Chart 3.IV: FDI stock as a percentage of GDP

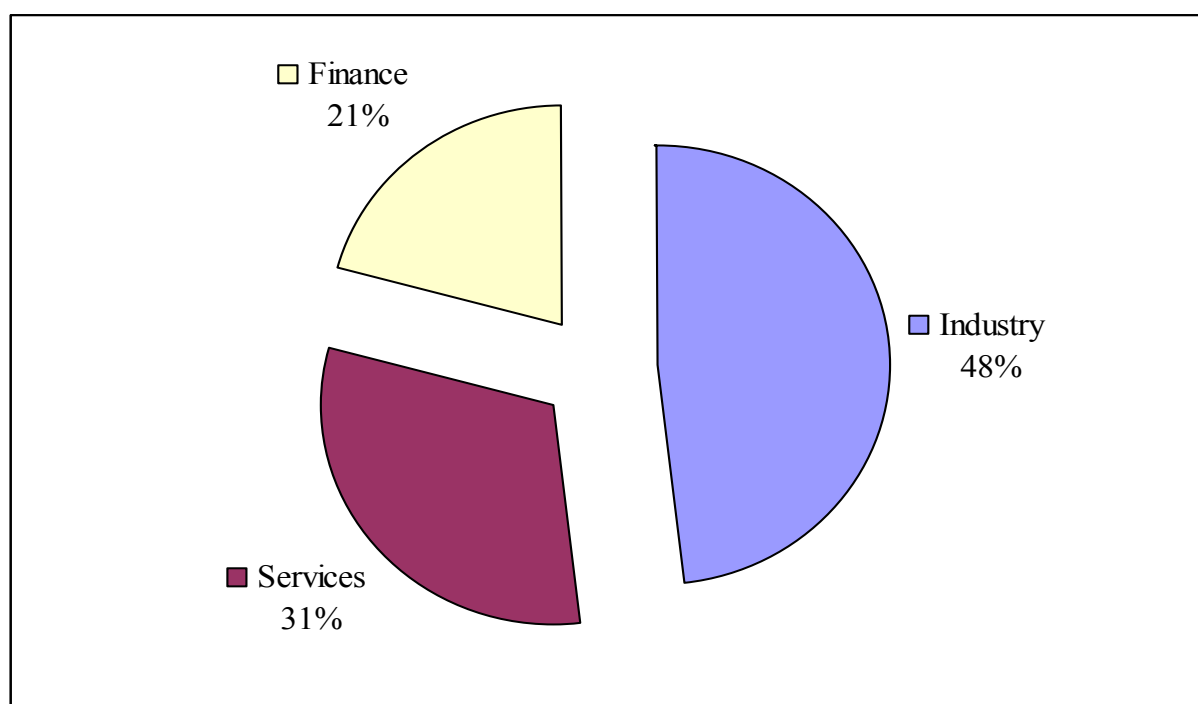


Source: Based on UNCTAD statistics, <http://stats.unctad.org/FDI>

3.1 Distribution by sectors

In contrast to the situation from mid-1990s, sectoral distribution of inward foreign direct investment in transition countries shifts from manufacturing to primary sector and services. According to data on cross-border mergers and acquisitions (M&As) for 2006, FDI inflows in primary sector and services increased, while investments in manufacturing declined.

Chart 3.1.I: Cross-border M&As by sector in South-East Europe and CIS 2006



Source: Based on UNCTAD statistics, <http://stats.unctad.org/FDI>

Table 3.1.I: South-East Europe and CIS: cross-border M&As, by sector/industry, 2005-2006, in million of USD

Sector/industry	Sales		Purchases	
	2005	2006	2005	2006
Total Industry	17318	25130	6812	5034
Primary	2088	4374	2022	1799
Mining, quarrying and petroleum	2088	4360	2022	1784
Mining and quarrying	57	543	-	22
Petroleum	2031	3817	2022	1762
Secondary	6747	4570	2553	1265
Food, beverages and tobacco	1112	739	217	201
Textiles, clothing and leather	1	81	-	-
Chemicals and	232	3491	484	4

chemical products				
Metals and metal products	5323	166	1851	917
Machinery	12	4	-	-
Electrical and electronic equipment	-	25	-	143
Motor vehicles and other transport equipment	65	15	-	-
Services	8483	16185	2237	1971
Electricity, gas and water distribution	1488	950	52	31
Construction	-	49	-	-
Trade	108	298	-	5
Hotels and restaurants	128	35	-	30
Transport, storage and communications	3155	3150	327	860
Telecommunications	3105	2870	327	860
Finance	2677	10961	1858	1045
Business activities	153	492	-	-

Source: UNCTAD (2007, p. 66)

Primary sector. High energy prices pushed investments in primary sector, especially in oil and gas extraction, in some members of the CIS. According to cross-border M&A sales data for 2006 the share of this sector in total sales increased to 17%, compared to 12% the year before. However, the recent wave of domestic M&A in countries of the region, new restrictions and uncertainty over access to and the use of oil and gas transportation might deter further FDI, especially in extractive industries (UNCTAD 2007).

Manufacturing. Although total inward FDI flows in manufacturing declined over the last years, inflows in some industries, such as chemical one, the FDI inflows rose due to large

cross-border acquisitions in the pharmaceutical industry in South-East Europe (Croatia, Serbia and Romania). Still, investments in manufacturing represented 55% of all greenfield investments in the region in 2006.

Services. Due to increased cross-border M&A in banking, cross-border M&A sales in services almost doubled in value from 2005 (see Table 2). Besides, further attractive industries were energy generation and telecommunications. As far as greenfield investments are considered, number of projects rose by 28% from that of 2005, with construction attracting the highest share. Because of the region's skilled labor force, efficiency-seeking investments in the industries such as information technology and business services are gaining on importance. The share of FDI inflows in high value-added activities and research and development is also increasing (UNCTAD 2007).

3.2 Prospects

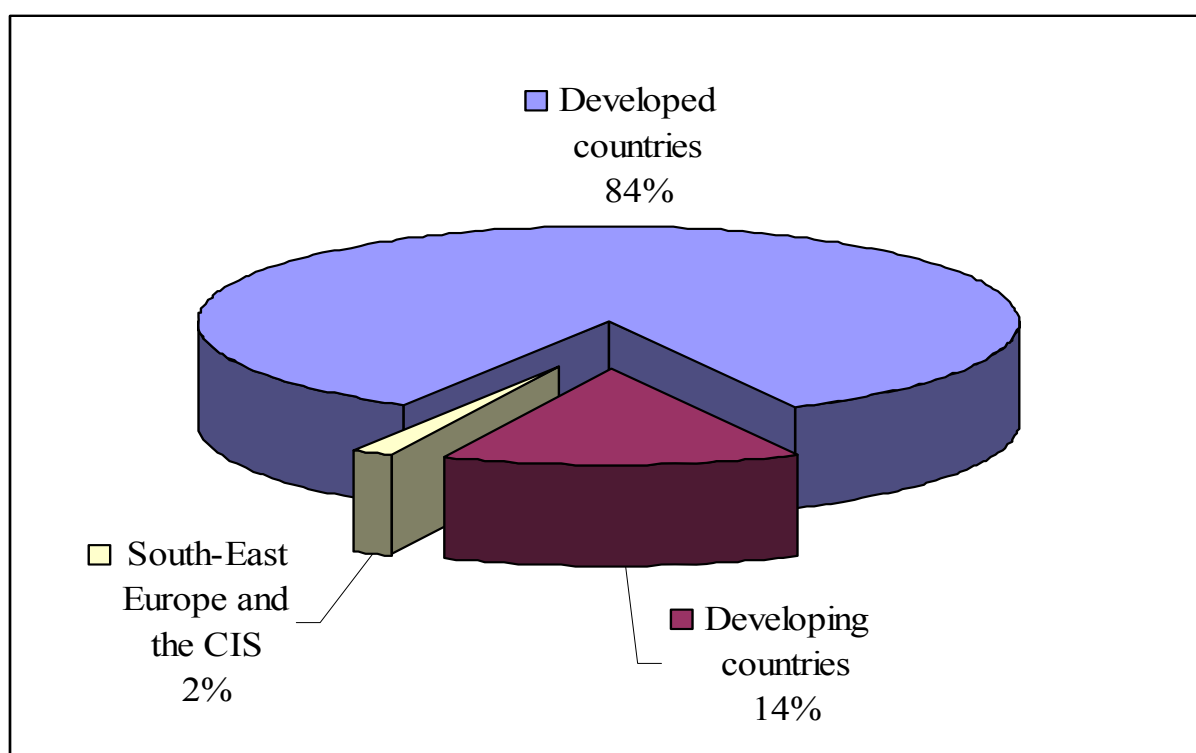
Four aspects describe dynamics of foreign direct investments in transition countries:

- a) Amounts of FDI inflows reflect the pace of market reforms and expectations of accession to EU. Faster reforms and transformation to market economies, as well as reforms in line with accession to European Union made smaller European transition countries be attractive destinations for foreign direct investments already in early 1990s. The same pattern can be observed in the case of Bulgaria and Romania, which evidenced a boom in foreign direct investment inflows in 2005 and 2006, two years preceding their accession to European Union on January the 1st, 2007.
- b) New-frontier for efficiency-seeking foreign direct investments is moving further to the East. Combination of massive foreign direct investment, strong economic growth and growth of productivity pushes labor costs upwards. Consequently, efficiency-seeking investment move further eastward. This explains recent high inward FDI in Bulgaria, Romania as well as in some CIS countries.
- c) Large economies as the Russian Federation, Ukraine and Poland will continue to attract market-seeking foreign direct investment. Strong real income growth, booming consumer market, and GDP growth averaging 7% in the last five years (IMF 2007a) make the Russian Federation being one of the most attractive locations for TNCs at the moment. According to UNCTAD's World Investment Prospects Survey, about 21% of the responding TNCs expected an increase in FDI inflows to the Russian

Federation, making it the fourth among the most preferred FDI destinations in the world.

- d) Outward FDI from transition countries are increasing. FDI outflows increased for the fifth consecutive year, reaching \$18.7 billion in 2006. The bulk of it (\$18 billion) was foreign investments done by the Russian TNCs. Other countries had a minor role in outward FDI from transition countries so far. Greenfield investments by the region's TNCs were mostly undertaken within the region, and were concentrated mostly in extracting industries, such as mining, metals and oil industry (UNCTAD 2007).

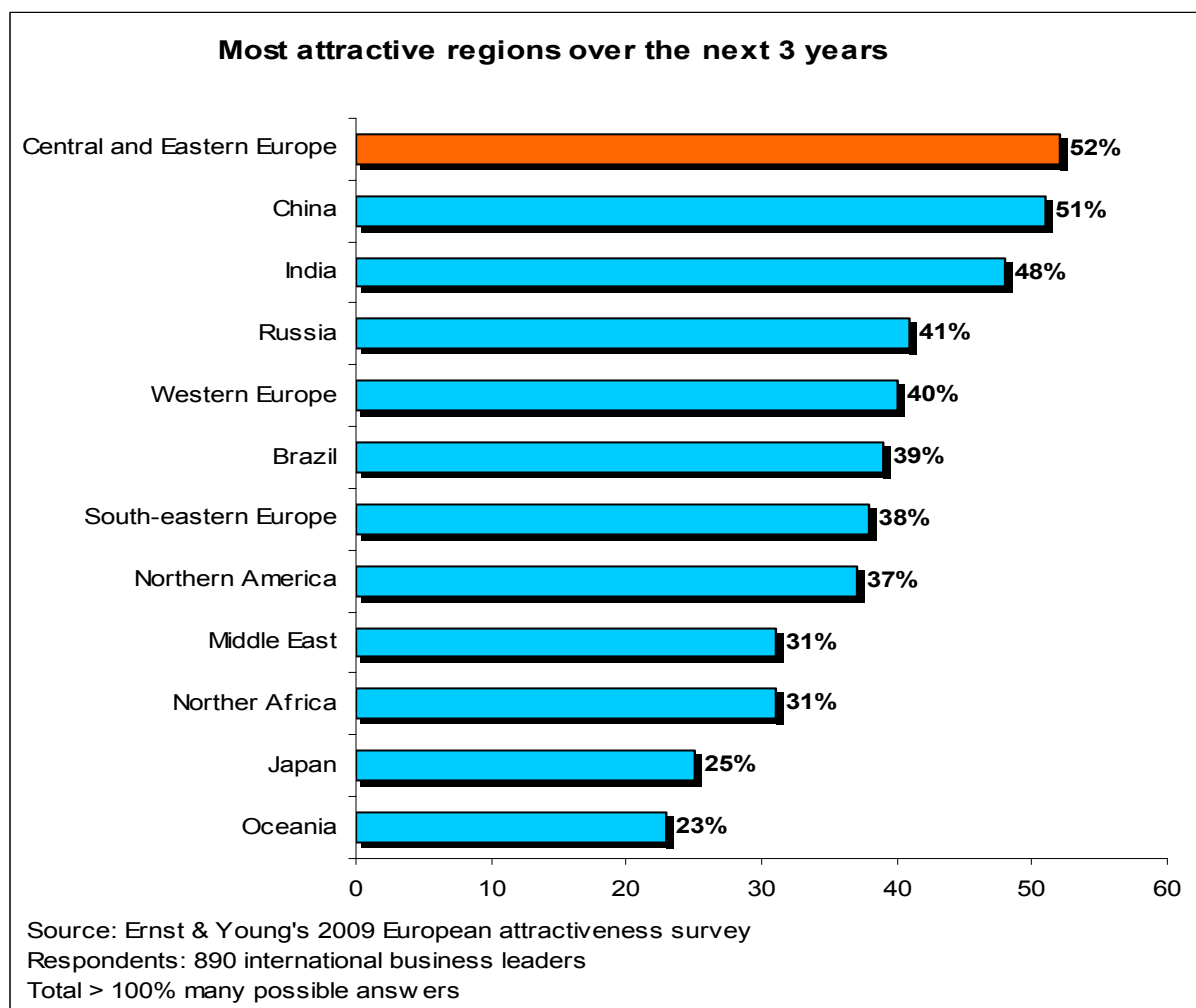
Chart 3.2.I: Outward FDI from transition countries



Source: Based on UNCTAD statistics, <http://stats.unctad.org/FDI>

Further prospects are essentially determined by the ongoing financial and economic crisis. *“Hit by the crisis, FDI activity in 2009 is likely to be dominated by non-cash merger and consolidation, as companies seek to survive economic turmoil by optimizing assets and merging activities to cut costs”* (Ernst and Young 2009). Risk management is at the top of companies' location strategies. Still, Western as well as Central and Eastern Europe are perceived by investors in “European attractiveness survey” of Ernst and Young (2009) as the safer FDI destinations. Moreover, Central and Eastern Europe is picked as most attractive FDI destination over the next 3 years.

Chart 3.2.II: Most attractive regions for FDI over the next 3 years



4 Productivity spillovers in transition countries: panel data analyses

4.1 Introduction

After a period of highly critical, almost hostile stance towards multinational companies, governments' attitude regarding foreign direct investment (FDI) changed radically in early 1990s. Last decade witnessed massive liberalisation of FDI regimes, especially in developing countries. In 2002, out of 248 regulatory changes in 70 countries, 236 facilitated foreign direct investments (UNCTAD 2003). Many governments offer today various inducements to attract multinational companies (MNCs). From the beginning of 1990s, transition countries, which are in focus of this paper, intensified the competition for foreign direct investments. Gradually all Central and Eastern European governments introduced a wide range of privileges such as tax and tariffs holidays, labour cost and infrastructure subsidies, exemptions from import duties etc., aimed to solicit foreign investments.

In contrast to earlier stance which was dominated mostly by anti-globalisation activists emphasising negative aspects of globalisation, current discussion on FDI is mainly characterised by expected positive economic effects from direct investments of multinational companies. Especially in connection with chronic capital shortage in developing countries, FDI provides for this indispensable engine of economic growth. The most striking feature which distinguishes direct investments through multinational companies from other forms of international capital flows – portfolio investment and foreign aid – is the long-lasting interest of investing company in its subsidiaries abroad. This long-term interest provides not only for pure capital transfer but also for the transfer of product and process technology, know-how and marketing and managerial skills. By definition, multinational companies possess these skills that enable them to compete successfully with domestic firms, which in turn have better knowledge of national market, have established supplier and customer networks, are better informed about business practices and informal institutions. If we add to this the fact that the bulk of all innovations are made in TNCs, it is easy to see how important they are for the international technology transfer. International organisations point to FDI as the best channel for technology transfer, not only across national boundaries but also between firms (UNCTAD 2003). Namely, as foreign companies enter new markets they disturb the existent market equilibrium, triggering a range of reactions of domestic firms. Additional competition pushes for efficiency improvements, which become necessary if a firm is to keep its market

shares. On the other side, domestic firms can learn from foreign companies about new products, process technology and marketing and organisational skills, as well as about foreign markets. If they succeed to become partners of foreign companies – as suppliers or distributors – domestic firms may benefit from economies of scale, reliable payments and often direct support from foreign partners in upgrading their capital stock and technological level. If such technology transfer really takes place in practice, the improvements in performance of domestic firms will then reflect in higher productivity.

This paper puts this expectation into a question. Using a methodological approach already taken in the literature I explore empirically the impact of foreign direct investments on productivity of firms in the Czech Republic, Poland, Hungary, Romania and Bulgaria. Using a large firm level panel I address two key questions: (1) whether foreign equity participation is positively correlated with plant productivity and (2) whether foreign ownership in an industry affects the productivity of domestic firms – i.e. whether there are positive spillovers to domestic enterprises?

In contrast to many other empirical studies on productivity spillovers in transition countries, I found a negative or insignificant “net productivity” effect from foreign ownership on domestically owned firms. Introduction of regional presence of foreign firms as a measure of positive spillovers accruing from learning, shows some evidence of positive spillovers, but overall impact on performance of domestic firms remains negative.

4.2 Technology transfer, productivity spillovers and competition

Although concerned with explaining foreign-owned production from very different points of view, the existing literature on multinational companies and foreign direct investment agrees upon the fact that companies involved in foreign investments abroad have some “monopolistic” advantages. There are as many kinds of such advantages as there are functions in making and selling a product. The firm’s advantage can be that it can acquire factors of production at a lower cost than other firms; or it may have knowledge or control of a more efficient production function; or the firm may have better distribution facilities or a differentiated product (Hymer 1960). Besides location and internalisation related benefits, possession of ownership advantages, which largely take form of intangible productive assets such as technological know-how, marketing and managerial skills, export contacts,

coordinated suppliers and customers networks and reputation, is condition sine qua non for a firm to be engaged in value-adding activities abroad (Dunning 1988). Given that national firms have advantage of better information about their country – its economy, its language, its law, and its politics – and given the possibility of existence of barriers to international operations arising from discrimination by government¹², consumers¹³, and by suppliers, the possession of those firm-specific assets enables multinational companies to compete successfully with domestic firms.

Transaction-cost approach holds a good deal of power in explaining why dispersed plants should fall under common ownership and control rather than simply trade with each other on open markets. The monopolistic advantages are subject to a daunting list of infirmities for being detached and transferred by sale or lease (Caves 1996). Inter alia, the intangible assets are difficult to codify, information asymmetries and market imperfections make technology transfer within firms more efficient than through arms-length contracts. Given this, TNCs can be seen as supplements for markets for technology. Together with the fact that parent companies are interested in economic exploitation of their monopolistic advantages abroad, this implies that foreign subsidiaries abroad have a privileged access to technology¹⁴. Since the assets are almost always gained through experience and, at least to some degree are public goods, they cannot be easily licensed to host country firms¹⁵, but they can be transferred at small extra costs to subsidiaries that locate in host countries. The access to the superior knowledge reflects in better performance of firms with foreign equity participation. This so-called **“own-plant”** or **direct effect** raises automatically the productivity level in FDI receiving countries.

In addition to this direct transfer of technology to plants receiving foreign capital, many authors suggest something like a “contagion” effect outgoing from foreign subsidiaries (Findlay 1978). Although the intangible firm-specific assets may not be licensed, domestic industry might benefit from the presence of foreign firms. In existing literature it belongs almost to stylised facts that there are positive externalities accruing from foreign direct

¹² Discrimination by government is rather unlikely today. Given the massive inducements aimed to attract foreign direct investments, we can say that multinational companies enjoy very preferable conditions nowadays.

¹³ The recent example of discrimination of foreign products and foreign companies can be observed in Arab world, where in the wake of overall resentment against USA, consumers boycotted US products.

¹⁴ The term technology means here actually the proprietary assets in all its facets, from product to process technology, trade marks, contacts and networks, marketing and managerial skills etc.

¹⁵ This depends also on competition structures on target market and level of development of domestic firms among which multinational firms can pick out eventual partners. Given relative low productivity and technology level in developing countries, foreign subsidiaries are the most probable form of servicing these markets.

investment (Aitken and Harrison 1999; Teece 1977). Since technology is public good to some extent, host economies can benefit from foreign investment¹⁶, even if the TNCs decide to carry out their foreign operations in wholly-owned affiliates. These benefits take form of various types of externalities and are often referred to as **productivity spillovers** (Blomström et al. 2000).

4.2.1 Productivity spillovers

Generally speaking, productivity spillovers are said to take place when the entry or presence of foreign affiliates lead to productivity or efficiency benefits in the host country's local firms, and the TNCs are not able to internalize the full value of these benefits (Blomström et al. 2000). We can think about several channels of productivity spillovers or, in other words, of how positive externalities from FDI occur. The simplest example might be the case where a domestic firm improves its productivity by **imitating** technology used by foreign affiliates operating in the local market. Becoming aware of new products and process technologies, local firms can learn about and try to copy them. Also, as experienced workers leave the foreign firms, the accumulated **human capital** becomes available to domestic firms.

Especially high potential for productivity spillovers have positive externalities accruing from direct business linkages between foreign and domestic firms. While in the case of imitation or labor turnover foreign companies as technology holders have an incentive to prevent leakage of knowledge and to protect its “monopolistic” advantages over their local competitors, in the case of **backward and forward linkages**, foreign partners often have interest in increasing the productivity of its local suppliers and/or distributors, to provide for high-quality intermediaries or for adequate distribution of products. In these cases they support directly their local partners helping them to set up or upgrade its production facilities, train employees and help in management and organization. Moreover, foreign firms would increase demand for local inputs and in this way provide for better economies of scale for domestic firms.

¹⁶ Other, foremost employment and capital inflows benefits are crucial for a comprehensive assessment of the impact of FDI on receiving economies, but this paper does not touch on this.

4.2.2 Competition

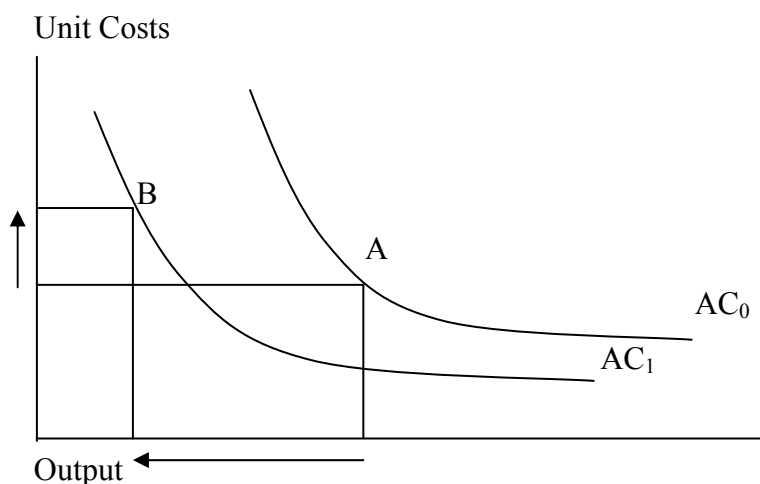
There is still no consensus in the literature on the question if competition pressure arising from entrance of foreign firms should be classified as positive or negative impact on the productivity of other and foremost domestic firms in FDI target market. Blomström et al. (2000) emphasize efficiency improvements in local firms as a positive externality from additional competition, since it “*forces local firms to introduce new technology and work harder*”. Using detailed data on Indonesian establishments the same author finds some empirical evidence for this hypothesis, showing that productivity spillovers were restricted to non-exporting Indonesian firms, in contrast to export-oriented firms, which already faced competitive pressure from the world market (Blomström and Sjöholm 1998).

However, the most of the empirical studies based on firm-level panel data fail to find positive correlation between the productivity of domestic firms and the extent of foreign presence in their sector and/or region¹⁷. Aitken and Harrison (1999) find an overall negative impact from foreign presence in sector and productivity of domestically owned firms in the same sector. They explain this by the fact that the net productivity effect from FDI is dominated by the negative **market stealing effect** accruing from intensified competition after the entrance of foreign firms. Fixed costs and shrinking market shares result automatically in lower productivity of domestic firms, which are unable to make up for this productivity loss.

Hence, while on the one hand the foreign presence in an economy may stir some learning process and produce positive externalities for local firms, it results at the same time, especially in developing countries where the gap in productivity between foreign and domestic firms is high, in a negative **demand effect**, which pushes the productivity of local firms automatically downwards. These two offsetting effects were formally modelled by Aitken and Harrison (1994) and are depicted in Chart 4.2.2.I. Positive spillovers cause the domestic plant's average costs curve to fall from AC_0 to AC_1 . However, the additional competition and shrinking market share forces the domestic plant to reduce output and move upwards its new AC_1 curve.

¹⁷ See, for example, Haddad and Harrison (1992) on Morocco, Aitken and Harrison (1999) on Venezuela, Djankov and Hoekman (2000) on the Czech Republic.

Chart 4.2.2.I: Output response of domestic firms to foreign entrants



4.3 Empirical evidence

Since seminal works on foreign direct investment and horizontal productivity spillovers, i.e. spillovers from foreign presence in the same industry, done by Caves (1974) on Australian and by Globerman (1979) on Canadian manufacturing sector, similar studies have been made for many developed and developing countries¹⁸. Since most of the studies base on more or less the same methodological framework set up by Caves (1974), the differences in outcomes are much dependent on the data used in the analysis, especially on the data aggregation level.

In this sense most of industry level studies find a positive correlation between foreign presence and sectoral productivity¹⁹. These studies have two main drawbacks. First, it is difficult to establish the direction of causality. It is possible that this positive association is caused by the fact that multinationals tend to locate in high productivity industries rather than by genuine productivity spillovers (Javorcik Smarzynska 2004). Second, already mentioned negative demand effect from FDI may force less productive domestic firms to exit the market while the high productive multinationals increase their market shares, which finally raise the average productivity in the industry.

Indeed, most analyses based on firm-level panel data fail to find evidence on positive correlation between foreign presence and productivity of local firms. This is especially the

¹⁸ For a survey of the literature, see Görg and Strobl (2001).

¹⁹ Beside already mentioned studies by Caves (1974) and Globerman (1979), see also Blomström and Persson (1983), Blomström and Wolf (1994).

case for developing countries, as studies by Haddad and Harrison (1993) on Morocco and Aitken and Harrison (1999) on Venezuela clearly show. The picture seems to be more optimistic in the case of developed countries²⁰.

Studies on productivity spillovers from foreign direct investments in transition countries appeared on FDI research agenda in the last several years. Except for a few industry level studies which find a positive correlation between foreign presence and industry average productivity²¹, the most firm-level data analyses show either negative or statistically insignificant net effect from foreign presence on the productivity of domestic firms in the same sector²². Recent studies by Javorcik Smarzynska (2004) as well as Schoors and van der Tol (2002) analyse explicitly the relationship between productivity spillovers and vertical linkages in transition countries. The empirical results show that there are positive spillovers from linkages between foreign and local firms and that they are economically more important than sectoral i.e. horizontal effects. Such results do not comply with findings of a qualitative study on productivity spillovers in Hungary (Günther 2003). The author found a very limited scope for both horizontal and vertical technology spillovers. Possible explanations the author sees in the substantial gap in technology levels between foreign and local firms and poor capital investments in domestically owned firms.

4.4 Data and methodological framework

The data used in this study constitute an unbalanced panel with annual information on more than 8000 manufacturing firms in five transition countries: the Czech Republic, Hungary, Poland, Romania and Bulgaria. The years covered are 1993 through 1999 (for Hungary from 1994 until 2000). The data have been retrieved from the financial database AMADEUS, Bureau van Dijk (2000). In addition to standard financial information, the database gives details on a number of variables such as firm's equity ownership position, industry classification and region in which the firm is registered.

²⁰ See, for example, Haskel et al. (2002) on UK, Aitken et al. (1996) on Mexico, Venezuela and USA (1996).

²¹ See Barrell and Holland (2000), Bedi and Cieslik (2002).

²² See Djankov and Hoekman (2000), Kinoshita (2001), Bosco (2001), Konings (2001) and Damijan et al. (2003) for horizontal spillovers in transition countries.

Table 4.4.I shows most important summary statistics for 1999 according to ownership. Foreign firms are defined as firms with any foreign share in the total capital²³. Average firm's sales, which approximate firm's output, are in all countries several times higher for foreign firms than for their domestic counterparts. Number of employees shows that the panel covers foremost middle-size enterprises with average number of employees not exceeding 800 employed persons. In contrast to sales figures, the difference in average employment in foreign and domestic firms turns out much more moderate, what indicates a higher productivity of foreign firms. The higher productivity in foreign firms may partially be explained by higher average capital stock, measured by tangible fixed assets, i.e. by higher capital intensity.

Table 4.4.I: Summary statistics according to ownership for 1999

	No of firms		Sales		No of employees		Capital stock	
	Dom	For	Dom	For	Dom	For	Dom	For
Czech Republic	1277	273	14567 (40792)	55622 (233860)	427 (734)	712 (1674)	6532 (29531)	23903 (70853)
Hungary	747	442	23769 (144292)	58301 (305501)	413 (1211)	439 (868)	8052 (74734)	25188 (191068)
Poland	2159	381	22792 (120148)	65910 (136725)	432 (714)	615 (871)	10407 (75315)	20600 (43410)
Romania	1381	604	4112 (18102)	7568 (20811)	558 (1125)	554 (975)	2584 (22943)	4073 (23279)
Bulgaria	1447	164	2403 (9539)	15360 (68314)	282 (623)	540 (848)	1480 (8615)	7186 (16682)

Note: Variables are mean values. Standard deviations are in parentheses. All financial variables are expressed in thousands US\$.

To examine the correlation between firm's productivity and (1) foreign ownership and (2) foreign presence in an industry and region, the approach taken by the earlier literature is followed, in particular the model employed by Aitken and Harrison (1999). A log-linear production function is estimated at the plant level to examine two main questions: (1) whether foreign equity participation is associated with higher plant's productivity and (2) whether foreign ownership in an industry affects the productivity of domestically owned firms in the same industry – i.e. whether there are positive or negative “spillovers” to domestic plants. Both questions can be nested in the following general specification:

$$Y_{ijt} = C + \alpha_1 FS_Plant_{ijt} + \alpha_2 FS_Sector_{jt} + \alpha_4 X_{ijt} + \varepsilon_{ijt}$$

²³ This did not make any significant difference in total number of foreign firms compared to mostly used 10 per cent threshold suggested by OECD definition of foreign direct investment.

The log output Y_{ijt} for the plant i in the sector j at the time t is regressed on a vector of inputs X_{ijt} and two measures of foreign ownership. To examine the correlation between firm's productivity and foreign capital participation, FS_Plant is defined as (1) the share of foreign capital in the plant's total capital or (2) dummy variable with value 1 if a firm has any foreign capital and 0 for completely domestic firms. Positive coefficient on FS_Plant would confirm the hypothesis of higher productivity of firms with foreign capital. To the extent that the productivity advantages spill over to domestic firms, the coefficient on FS_Sector should be positive. FS_Sector measures the intensity of impact of foreign firms in a 2-digit NACE sector and is defined as weighted foreign share in total sector's output. Alternative specification of sectoral foreign participation as weighted foreign share in industry's employment gave basically the same results.

Inputs vector X_{ijt} consists of materials M_{ijt} approximated by material costs, labour L_{ijt} measured by number of employees and capital stock K_{ijt} approximated by firm's stock of tangible fixed.

The panel was estimated using an OLS estimator.

4.4.1 Foreign equity participation and productivity

Tables 4.4.1.Ia and 4.4.1.Ib report results for analyses of impact of foreign ownership on the total factor productivity. The log of real output Y_{ijt} is regressed on its inputs X_{ijt} and foreign equity participation. Regressions include annual time dummies and two-digit industry dummies to control for time and industry specific productivity differences. Table 2a shows regression results for the case when FS_Plant is defined as a dummy variable, with value 1 if a firm has received any foreign capital and 0 otherwise. Estimation coefficients for FS_Plant are, as expected, positive and statistically significant. Productivity advantages associated with foreign ownership are especially pronounced in Poland, Romania and Bulgaria.

Table 4.4.1.Ia: Comparison of the level of total factor productivity between foreign and domestically-owned firms (dependent variable: log output)

	Czech Republic	Hungary	Poland	Romania	Bulgaria
<i>FS_Plant_{ijt}</i>	0.036*	0.088*	0.426*	0.245*	0.293*
(0/1)	(0.008)	(0.020)	(0.033)	(0.011)	(0.024)
$\log(M_{ijt})$	0.818*	0.772*	0.409*	0.622*	0.588*
	(0.003)	(0.008)	(0.012)	(0.004)	(0.006)
$\log(L_{ijt})$	0.121*	0.105*	0.188*	0.283*	0.277*
	(0.004)	(0.011)	(0.018)	(0.006)	(0.012)
$\log(K_{ijt})$	0.048*	0.072*	0.153*	0.011*	0.076*
	(0.003)	(0.009)	(0.011)	(0.004)	(0.007)
Industry dummies	yes	Yes	yes	yes	Yes
Annual time dummies	yes	Yes	yes	yes	Yes
Adjusted R ²	0.96	0.92	0.72	0.92	0.87
Included observations	6791	1655	3036	8664	6479

Standard errors in parentheses. (*): significance at 1% level.

Alternative specification of *FS_Plant* as share of plant's total capital which is foreign owned i.e. as a continuous variable taking value between 0 and 100, corroborates the previous results (Table 4.4.1.Ib).

Table 4.4.1.Ib: Comparison of the level of total factor productivity between foreign and domestically-owned firms (dependent variable: log output)

	Czech Republic	Hungary	Poland	Romania	Bulgaria
<i>FS_Plant_{ijt}</i>	0.0003*	0.001*	0.005*	0.003*	0.004*
	(0.0001)	(0.0002)	(0.0004)	(0.0001)	(0.0004)
$\log(M_{ijt})$	0.819*	0.773*	0.407*	0.624*	0.586*
	(0.003)	(0.008)	(0.012)	(0.004)	(0.007)
$\log(L_{ijt})$	0.119*	0.106*	0.187*	0.285*	0.286*
	(0.004)	(0.011)	(0.019)	(0.006)	(0.012)
$\log(K_{ijt})$	0.047*	0.071*	0.153*	0.011*	0.073*
	(0.003)	(0.009)	(0.011)	(0.004)	(0.007)
Industry dummies	yes	Yes	yes	yes	Yes
Annual time dummies	yes	Yes	yes	yes	Yes
Adjusted R ²	0.96	0.92	0.71	0.92	0.86
Included observations	6701	1643	2970	8659	6169

Standard errors in parentheses. (*): significance at 1% level.

4.4.2. Productivity spillovers

If foreign firms i.e. their productivity advantages emit any externalities for domestic firms or, in other words, if domestic firms benefit somehow from the superior technology in foreign firms, then these productivity spillovers should be larger if the foreign presence in an industry is larger. That means that the productivity of domestic firms in those sectors in which foreign presence measured by their weighted share in total output or employment is larger should be higher. Hence, the coefficient with FS_Sector defined as weighted share of foreign output in the total industry's output should be positive. To test for this, the following equation was estimated:

$$\log Y_{ijt} = C + \alpha_1 FS_Sector_{jt} + \alpha_2 \log M_{ijt} + \alpha_3 \log L_{ijt} + \alpha_4 K_{ijt} + \alpha_5 D_t + \alpha_6 f_j + \varepsilon_{it}$$

The foreign presence variable FS_Sector is defined at 2-digit NACE level as:

$$FS_{jt} = \frac{\sum_i FS_{ijt} * Y_{ijt}}{\sum_i Y_{ijt}}.$$

The estimation results are presented in Table 4.4.2.I. The coefficients for FS_Sector are, contrary to expectations, either negative or statistically insignificant. Negative and statistically significant results for Romania and the Czech Republic indicate that domestic plants in sectors with more foreign ownership are significantly less productive than those in sectors with less foreign investment. Coefficient for foreign presence catches a net impact of foreign presence on domestic firms at 2-digit level sectors.

Table 4.4.2.I: Impact of foreign investment in 2-digit industry on productivity of domestic firms. Dependent variable - Log output produced by domestically-owned firms

	Czech Republic	Hungary	Poland	Romania	Bulgaria
FS_Sector_{jt}	-0.001*** (0.001)	0.001 (0.001)	-0.004 (0.003)	-0.002* (0.0004)	-0.002 (0.0015)
$\log(M_{ijt})$	0.82* (0.004)	0.765* (0.010)	0.411* (0.014)	0.616* (0.005)	0.581* (0.007)
$\log(L_{ijt})$	0.125* (0.005)	0.123* (0.013)	0.170* (0.020)	0.306* (0.007)	0.312* (0.013)
$\log(K_{ijt})$	0.040* (0.003)	0.050* (0.011)	0.166* (0.012)	0.003*** (0.005)	0.067* (0.007)
Industry dummies	yes	yes	yes	yes	Yes
Annual time dummies	yes	Yes	yes	yes	Yes
Adjusted R ²	0.96	0.92	0.71	0.92	0.86
Included observations	5202	973	2524	6305	5809

Standard errors in parentheses. (*): significance at 1 per cent level; (**): significance at 5% level; (***): significance at 10% level.

4.5 Productivity spillovers vs. demand effect

Still negative coefficient for foreign share on sectoral level does not preclude the possibility that some technology transfer from foreign to domestic firms does occur. Considering the already mentioned channels for technology diffusion it can be expected that technology transfer takes place at local level. Whether trained workers leave the joint venture to work at nearby domestic firms, or whether a joint venture demonstrates a product, process or market previously unknown to domestic owners, the benefits are likely to be received by neighbouring domestic firms first, before they diffuse to other, more distant domestic firms. More important, the back- and forward linkages between foreign and domestic firms are probably to develop at regional level. Regional aspect might be particularly important in Central and Eastern European Countries. Regional concentration of foreign direct investment in capital and most western regions was one of the most striking characteristics of FDI flows in the most European transition countries, so that the whole impact intensity is focused on only several regions. At the same time, it is reasonable to assume that negative demand effect may be observed at national level, since foreign and domestic firms compete at national markets.

To test for possible positive effects from FDI at the local level, the analyses are extended to include a variable which measures foreign presence in industry within each NUTS 2 region²⁴. This variable is calculated as the share of the industry j 's output in the region s produced in foreign firms located in the industry and the region.

Table 4.5.Ia: Impact of sectoral and regional foreign investment on productivity of domestic firms. Dependent variable - log output produced by domestically-owned firms

	Czech Republic	Hungary	Poland	Romania	Bulgaria
FS_Sector_{jt}	-0.0014** (0.0007)	0.0014*** (0.001)	-0.004 (0.003)	-0.002* (0.0004)	-0.002 (0.0015)
$FS_Sector\&Region_{jst}$	0.0004** (0.0002)	0.0002 (0.001)	0.001** (0.001)	0.0003 (0.0002)	-0.0004 (0.0005)
$\log(M_{ijt})$	0.82* (0.004)	0.764* (0.010)	0.411* (0.014)	0.616* (0.005)	0.581* (0.007)
$\log(L_{ijt})$	0.125* (0.005)	0.123* (0.013)	0.172* (0.020)	0.306* (0.007)	0.312* (0.013)
$\log(K_{ijt})$	0.040* (0.003)	0.050* (0.011)	0.166* (0.012)	0.003*** (0.005)	0.067* (0.007)
Industry dummies	yes	Yes	yes	yes	Yes
Annual time dummies	yes	Yes	yes	yes	Yes
Adjusted R ²	0.96	0.92	0.71	0.92	0.86
Included observations	5202	973	2524	6305	5809

Standard errors in parentheses. (*): significance at 1 per cent level; (**): significance at 5% level; (***): significance at 10% level.

As the regression results presented in Table 4.5.Ia show, inclusion of the industrial foreign share at regional level does not affect the negative net impact observed for Romania and the Czech Republic. The coefficient for FS_Sector for Hungary is now positive and statistically significant. The net impact for Poland and Bulgaria is negative, but statistically insignificant. Evidence for productivity spillovers at regional level can be found for the Czech Republic and Poland.

As further suggested by Aitken and Harrison (1999), foreign firms may be attracted to regions with higher productivity to benefit from agglomeration economies or better infrastructure. In this case, the coefficient on $FS_Sector\&Region$ would overestimate the positive impact of

²⁴ NUTS is European classification of regions.

location-specific foreign investment on productivity. To control for these location-specific variations in productivity due to agglomeration economies or other region-specific effects, an additional variable was introduced: total number of firms in a region²⁵. The results of the regressions after this variable was taken into account are shown in Table 4.5.Ib.

²⁵ Other variables such as real wage for skilled workers or electricity prices as used by Aitken and Harrison (1999) might better control for location-specific advantages, but data limitations did not allow for use of these variables in the present work.

Table 4.5.Ib: Impact of sectoral and regional foreign investment on productivity of domestic firms. Dependent variable - log output produced by domestically-owned firms

	Czech Republic	Hungary	Poland	Romania	Bulgaria
	-0.001**	0.002***	-0.003	-0.002*	-0.002
<i>FS_Sector_{jt}</i>	(0.001)	(0.001)	(0.003)	(0.0004)	(0.0015)
<i>FS_Sector&</i>	0.0003**	-0.0004	-0.001	0.0003	-0.001**
<i>Region_{jst}</i>	(0.0002)	(0.001)	(0.001)	(0.0002)	(0.0005)
	0.82*	0.758*	0.411*	0.616*	0.576*
$\log(M_{ijt})$	(0.004)	(0.010)	(0.014)	(0.005)	(0.007)
	0.125*	0.132*	0.170*	0.306*	0.318*
$\log(L_{ijt})$	(0.005)	(0.013)	(0.020)	(0.007)	(0.013)
	0.040*	0.050*	0.166*	0.003***	0.068*
$\log(K_{ijt})$	(0.003)	(0.011)	(0.012)	(0.005)	(0.007)
	-0.00005**	0.0001*	0.0002*	0.00001	0.0005*
Firms No	(0.00002)	(0.00002)	(0.00003)	(0.00002)	(0.00005)
Industry dummies	yes	Yes	yes	yes	Yes
Annual time dummies	yes	Yes	yes	yes	Yes
Adjusted R ²	0.96	0.92	0.71	0.92	0.86
Included observations	5202	973	2524	6305	5809

Standard errors in parentheses. (*): significance at 1% level; (**): significance at 5% level; (***): significance at 10% level.

After controlling for location-specific advantages, positive coefficients on regional foreign investment in Table 4.5.Ia tend to sink, as shown in Table 4.5.Ib. Positive and statistically significant coefficient on productivity spillovers can now be observed only for the Czech Republic. In the case of Bulgaria, this coefficient is even negative. For other countries it is statistically insignificant. The negative net impact from foreign presence on Czech and Romanian firms remained robust after inclusion of regional variable. Although there is no evidence of positive productivity spillovers at regional level, those Hungarian firms operating in sectors with more foreign investment are more productive than those domestic firms in sectors with less foreign presence.

Positive and statistically significant correlation between the number of firms in a region and firms' productivity confirm the observation that foreign investment are likely to locate in those regions where they can benefit from agglomeration economies and better infrastructure.

4.6 Conclusions

Using an unbalanced panel of more than 8000 firms in five transition countries, two main effects from foreign direct investment on firm's productivity in host country can be observed. The first question addressed in this paper – if firms' productivity is associated with foreign equity participation – can be answered affirmatively. Coefficients on foreign capital participation are positive and statistically significant for all countries. Productivity advantage associated with foreign ownership is much more pronounced in firms with some foreign ownership in Poland, Romania and Bulgaria than in Hungary and the Czech Republic. This might be explained by low initial productivity level in firms receiving foreign capital, but more detailed research is needed to see if this productivity advantage holds for both joint ventures and wholly foreign owned companies.

Despite expectations, estimation results do not provide strong evidence for positive spillovers from foreign direct investment in a sector on domestic firms in the same sector. To the extent that domestic and foreign firms compete on national markets, there is a weak evidence to support the hypothesis that technology is transferred locally from foreign to domestic firms. In fact such evidence was found only for the Czech companies. In other countries, the positive correlation between higher productivity of domestic firms and regional foreign presence can be better explained by the fact that foreign companies are attracted to regions with highest productivity, to benefit from agglomeration economies, than by productivity spillovers from foreign to domestic firms.

More important is the evidence that even if some technology transfer and some positive externalities arise from foreign direct investment, net impact from foreign presence in sector on the productivity of domestic firms in the same sector seems to be dominated by the negative demand effect. Robust evidence for this is provided by negative and statistically significant coefficients on foreign presence in industries in the Czech Republic and Romania.

Interesting is positive and statistically significant coefficient on the overall productivity effect from foreign investment found for Hungary. At the first site it seems to negate the previous results. However, a more careful view at the results give us further insights into dynamics of foreign direct investment, competition and productivity spillovers. As the Chart 6.1.I shows, Hungary received the bulk of the foreign direct investment already by the middle 1990s. In

1995 foreign sector made almost one third of GDP. Hence in the case of Hungary we might observe a long term effect from foreign direct investments on productivity. Given a large productivity and technology gap between foreign and domestic firms in Hungary, negative demand effect triggered by the entrance of foreign firms already at the begin of 1990s, forced less productive Hungarian firms to exit the market, before they managed to develop a knowledge base that would enable them to learn from foreign counterparts. At the same time, the explicit evidence for productivity spillovers in Hungary is missing. Thus it seems that the dynamics of the impact of FDI on productivity are characterised by the immediate and direct market stealing effect and long-term and conditional learning process.

Altogether, the presented results show that there are clear benefits from foreign investment, but such benefits are internalised by joint ventures i.e. firms receiving foreign investment and fully foreign owned firms. Domestic owned firms may learn from foreign companies to some extent and in this way improve their performance. But, before they start learning from foreign counterparts, they might be forced to exit the market, unable to resist the competition pressure from companies with foreign capital.

Although the present study uses the same database for several transition countries, which have more or less the same macroeconomic and legal framework, surprising and in part contradictory results obtained, make any generalisations very difficult. How domestic firms react on foreign presence might depend on a whole range of country, industry, region and most important firm specific factors. Initial productivity level, learning capability, R&D efforts and export-orientation determine a firm's response on additional competition and the extent to which it might benefit from foreign companies. On the other side, industry structure, openness of economy, level and forms of foreign investment and especially the integration of foreign sector into host economy through linkages with domestic firms influence the aggregate productivity effects at macro level. These and similar questions leave space for further research.

5 Productivity spillovers and absorptive capacity

5.1 Introduction

It is often argued that domestic firms may improve their productivity if there are positive externalities emanating from multinationals, although domestic firms may be affected negatively if competition with multinationals reduces domestic firms' market shares and, thus, leads to productivity reduction. As we saw in previous Chapter, there exists very mixed evidence of aggregate benefits which accrue to all types of FDI receiving countries and their local firms equally. Rather it seems that conditions in the host country, host region or investment target firm seem crucial for whether or not it comes to positive spillovers from foreign direct investment. In particular, absorptive capacity of domestic firms, that is their ability to "identify, assimilate and exploit outside knowledge" (Kinoshita 2000) has been assumed to be an important determinant for whether or not domestic firms benefit from FDI. Firms can increase their stock of knowledge by deliberate investment in R&D capital or by diffusion of existing knowledge. Therefore R&D investments affect firms' productivity via two channels. First, innovations generated by R&D enhance firm's knowledge base and in this vein increase firms' productivity directly. Second, by investing in R&D and enhancing its knowledge and technology level, firms at the same time extend their "learning" ability and absorptive capacity for new technologies created in their environment.

For five transition countries: Poland, the Czech Republic, Hungary, Romania and Bulgaria, I investigate effects of both aspects of R&D investment on firms' productivity: 1) the innovation capacity of R&D investment and 2) "absorptive" or "learning" capacity of R&D activity as proposed by Cohen and Levinthal (1989). In the first case, R&D investment increases directly the productivity by enhancing firm's knowledge base. In the second, higher investments in R&D are interpreted as higher absorptive capacity of a firm and thus its higher ability to identify and implement new technologies from its environment. In other words higher R&D investments imply higher potential for technology spillovers between firms, here especially between foreign and domestic firms. The second aspect is more relevant for developing and transition countries since they are more reliant on imitation of existing technologies than on own innovations.

The results show different effects of innovation and absorptive R&D in five transition countries in the empirical set-up of this study.

Building on the existing literature, the paper presents at least two motives of interest. First, it utilizes a combination of firm level data-sets which allows comparing the effects of multinational presence across several countries. The characteristics and comparability of the available data permit to overcome one of the most recurrent limits of previous studies based on micro-data, which were typically focused on single host economies, and were thus unable to highlight country specific effects of inward investments. Empirical tests show that inward investments may have a different impact across countries.

Second, a generalization of results obtained for individual countries is attempted. I shall highlight how the absorptive capacity of local firms affects the utilization of externalities by multinational enterprises.

In the next section I discuss the relevant theoretical and empirical literature. In Section 5.3 empirical specifications are presented. In Sections 5.4 and 5.5 the data and the regression results are shown. In Section 5.6 the conclusions are given.

5.2 Research and development, absorptive capacity and productivity spillovers

Several economists have studied how the geographical concentration of industries facilitates knowledge flows between firms and thereby enhances the diffusion of innovations. Like industries, regions grow because their inhabitants interact and learn from each other. This exchange of knowledge is not always fully paid for by the recipients and is therefore an externality, called “knowledge spillovers”. The extent of knowledge spillovers is likely to depend on regional characteristics. For instance, one might expect the level of competition to have an effect on spillovers and growth. It is not certain, however, whether high competition will increase or decrease spillovers and growth. It depends on industry structure and on reactions of local firms. If there are many competitors, the likelihood that innovations and improvements will be imitated will increase. Thus, a lot of competition may inhibit firms from internalizing the rents of their own new knowledge and therefore reduce the rate of innovations and growth. However, the existence of many competitors may also stimulate firms to improve their processes and products, to create new technologies, to seek

improvements in the supply lines, and to revise their strategy and structure. Furthermore, a region's industry structure, such as the degree of diversification, can affect spillovers and growth. Knowledge gained by one firm, for example, may benefit other firms, primarily those in the same industry. Specialization of industries will then encourage knowledge flows, and one would expect regions with specialized industries to have relatively high growth. However, knowledge in one industry may also find applications in other industries and thereby increase their economic growth. Thus, if spillovers between industries are important, one can expect regions with diversified industries to have relatively high growth (Sjöholm 1999a).

The literature on productivity spillovers reached a consensus on the importance of absorptive capacity of domestic firms for diffusion of technology and productivity spillovers. However, the sign of this correlation is elaborated contradictory.

Lapan and Bardhan (1973) argue that firms need a certain absorptive capacity before they can benefit from new technologies developed by other firms. Cohen and Levinthal (1989) maintain that increased R&D activities help boost efficiency indirectly, because these activities speed up the assimilation of technologies developed outside the domestic sector.

Some works suggest that the larger the productivity gap, the larger the potential for technology transfer and for productivity spillovers. This assumption, labeled as the *catching up hypothesis*, can be derived from the original idea put forward by Findlay (1978), who in a dynamic model of technology transfer through FDI formalized technological progress in relatively "backward" regions as an increasing function of the distance between their own level of technology and that of the "advanced regions", and of the degree to which they are open to foreign direct investment. The wider the gap between the developed and the developing country, the larger is the potential for technological imitation, which will spur economic growth. Moreover, Findlay assumes the technology to be transferred through personal contacts, which are accomplished through FDI. The conclusions of Findlay's model is that, for a given amount of foreign presence, spillovers are larger the larger the technology gap between the foreign and domestic firms. Consistently with this hypothesis, Blomström and Wolf (1994) find evidence that the growth of gross output per employee of locally owned firms in Mexico between 1970 and 1975 is positively related to a measure of FDI and of initial labor productivity gap between locals and multinationals. In a similar vein, Driffield

(2001) shows that changes in productivity in the foreign sector, over 1986-1989, positively affected growth in productivity of domestic firms in the UK, and interprets this as evidence of catching up of local manufacturers stimulated by higher level competitors. Driffield and Love (2001) also obtain results which are largely consistent with the catching up hypothesis. In fact they highlight that technology exploiting FDI (proxied by investments originating from a country with higher sectoral R&D intensity than the host country) raise productivity in the UK industry, while technology sourcing FDI (proxied by investments originating from a country with a lower sectoral R&D intensity than the host country) do not have any productivity effect. Although their analytical purpose is different, they implicitly confirm that spillovers do appear when technology gaps are high and positive, while they do not show up when technology gaps are small and negative. Griffith, Redding and Simpson (2002) postulate the further away an establishment is from the technological frontier, the larger is the potential for technology transfer.

Still, Findlay acknowledges that a sort of lowest bound of local technological capabilities exists, below which foreign investment cannot be expected to have any positive effects on host economies. He recognized that technologies developed in the industrial world may be less suited for conditions in developing countries, which prevents any useful technological spillovers. This is in line with *technological accumulation hypothesis*. Scholars maintaining this hypothesis argue that the lower the technological gap between domestic and foreign firms, the higher the absorptive capacity of the former, and thus the higher the expected benefits in terms of technology transfer to domestic firms (Cantwell 1989).

The technological accumulation hypothesis goes further beyond this simplistic view of absorptive capacity and places new emphasis on the ability to absorb and utilize foreign technology as a necessary condition for spillovers to take place. The analyses of the responses of local firms to the entry and presence of US multinationals in European markets over 1955-1975 seems to suggest that the most positive impact occurs in industries where the technological gap is small (Cantwell 1989). This is consistent with the view that relatively low technological differentials between domestic and foreign firms would grant higher ability to local economies to capture technological opportunities and to respond to the stimuli created by TNCs. Kokko (1994) focuses on 156 industries that hosted TNCs in Mexico in 1970 and finds evidence that in those industries characterized by both large technological gaps and large foreign market shares, which he identifies as “enclave sectors”, local productivity

growth is significantly inhibited. His idea is that in such circumstances, TNCs are able to crowd out local competitors from the most important market segment, thus reducing the likelihood that positive benefits accrue to, and are captured by, local firms. In a more recent work on Uruguayan manufacturing plants, Kokko et al. (1996) find positive and statistically significant spillover effects only in the sub-sample of locally-owned plants with moderate technology gaps vis-à-vis foreign firms. They argue that small or moderate gap, in the case of Uruguayan plants, identify cases where foreign technologies are useful to local firms and where local firms possess the skills needed to apply or learn about foreign technologies. On the contrary, large gaps may signal that foreign technologies are so different from local ones that local firms have nothing to learn, or that local firms are unable to learn. By contrast, Sjöholm (1999b) finds that, in cross-sectional data for Indonesian manufacturing firms, productivity spillovers from foreign to domestic firms are larger the larger the technology gap (also defined in terms of differences in labor productivity) between those groups of firms and the higher the degree of competition in the industry. A possible explanation is that structural and institutional conditions in advanced countries favor the creation of linkages and exchange of knowledge between TNCs and local firms, while reducing to a minimum the risk that indigenous activities are disrupted due to competitive pressure, or to unfair practices and anti-competitive behavior. Besides, the non-significant impact of absorptive capacity might also have to do with the nature of recipient economies. In fact, contrary to LDCs, advanced countries are relatively close to the technological frontier and might have reached a threshold level of absorptive capacity required to benefit from foreign investments so that at the margin further increasing local firms' accumulation of technology would not augment the productivity spillovers from foreign investments.

Analyzing the Italian manufacturing industry, Imbriani and Reganati (1997) find that value added of domestic firms in sectors where the productivity gap between local and foreign firms is high is negatively related to foreign presence, while the opposite occurs where productivity gaps are low.

Girma et al. (2001) use firm-level data to examine productivity spillovers in UK manufacturing. They find evidence for spillovers to firms with a low difference between the firm's productivity level and the industry frontier productivity level (termed "technology gap"). Firms with a technology gap of 10 per cent or less appeared to increase productivity with increasing foreign presence in the industry, while firms with higher gaps seemed to

suffer reductions in productivity. Girma (2003) extends their analysis using threshold regression techniques on similar data. This technique allows him to characterize technology spillovers as a non-linear process where the impact of FDI can be positive, negative or neutral, depending on some critical value of the absorptive capacity distribution. He finds that there is a minimum absorptive capacity threshold below which the magnitudes of productivity spillovers are non-existent or even negative. Girma and Görg (2002) analyze the role of absorptive capacity in determining whether or not domestic establishments benefit from productivity spillovers from FDI using establishment level data for the electronics and engineering sectors in the UK. They calculate absorptive capacity as the gap in total factor productivity between domestic establishments and the “industry leader” and investigate how changes in absorptive capacity may determine the benefits to domestic firms. They also take account of a geographical dimension to spillovers by calculating two groups of variables to proxy spillovers from FDI located within the region and outside the region. This reflects the idea put forward, for example by Audretsch (1998), who argues that geographical proximity is necessary to facilitate knowledge spillovers as “knowledge is vague, difficult to codify, and often only serendipitously recognized”.

Using detailed micro data from the Indonesian manufacturing sector in 1980 and 1991, Sjöholm (1999b) finds that the effects of labor productivity differences (after controlling for capital intensities and scale of production) vary according to the specification he adopts, so that no clear conclusion can be drawn on this issue.

Analyzing a balanced panel of firm – level data on the manufacturing industries in France, Italy and Spain over the period 1992 – 1997, Castellani and Zanfei (2003) find positive and significant externalities on Italian firms, negative impact on Spanish firms and non-significant effects on French firms. Further they find that high gaps in productivity between domestic and foreign firms seem to favor positive effects of FDI, while absorptive capacity, measured by local firms’ average productivity, does not leverage productivity spillovers from FDI. Author believe that these results confirm the “catching up” hypothesis, which identifies a positive relation between the size of technological gap and growth opportunities induced by foreign investments, and contradict the “technological accumulation” hypothesis, which stresses the role of domestic absorptive capacity and of coherence between foreign and domestic technology as determinants of virtuous effects of inward investments.

Girma and Wakelin (2001) stratify micro data for the UK electronics industry according to size and skill intensity, and report that smaller plants or plants in the lower distribution of skill intensity lack the necessary absorptive capacity to benefit from FDI in their sector. But they also report that large establishments with higher skill intensity do not benefit from FDI, as they presumably operate near the technological frontier. This last point is echoed in the work of Haskel et al. (2002), where all industries in the same UK micro data set are pooled and the sample is split by employment, TFP and skill intensity quartiles. But in contrast to Girma and Wakelin (2001), they find that plants further away from the technology frontier gain most from foreign presence in their sector. This leads to conclusion that low absorptive capacity is not a hindrance to learning from foreign technology and goes more in line with “catching up” hypothesis.

Glass and Saggi (1998) also see a role for technological distance between the host and home country. They see the technology gap as indicating absorptive capacity of host country firms, i.e., their ability to absorb and utilize the knowledge that spills over from multinationals. The larger the gap, the less likely are host country firms to have the human capital and technological know-how to benefit from the technology transferred by the multinationals and, hence, the lower is the potential for spillover benefits.

These papers define absorptive capacity as technology gap in terms of productivity differentials between foreign and domestic firms. This is motivated by the idea that domestic firms with productivity levels similar to multinationals’ may also be more capable of absorbing the transferred technology. Other definitions of absorptive capacity have been put forward, however. Kinoshita (2001) finds evidence for positive spillovers from FDI to local firms that are R&D intensive in his analysis of firm level panel data for the Czech Republic. He interprets firms’ R&D intensity as a measure of absorptive capacity. Barrios and Strobl (2002) also take R&D active domestic firms for those having absorptive capacity. Additionally, they argue that exporting firms are more exposed to competition on foreign markets and may, therefore, be likely to have higher levels of technology, and thus, absorptive capacity, than non-exporters. In their empirical analysis, using firm level panel data for Spain, they find that, indeed, exporters benefited more from FDI spillovers, but that there was no apparent absorptive capacity effect from R&D active firms relative to those that are not R&D active.

Depending upon data availability and the context of the investigation, two basic methodological approaches are usually adopted. One is to divide the plants in the sample according to some perceived proxies for absorptive capacity, and compare the degree of spillovers across the sub-samples, see for example Kokko et al. (1996), Girma and Wakelin (2001) and Haskel et al. (2002).

Econometric estimates generated from such exogenous sample splitting procedures can run into serious inference problems though. Hansen (2000) demonstrates that standard asymptotic confidence intervals need not be valid. There is also the obvious criticism that the sample tends to be divided in an ad hoc fashion as the decision concerning the appropriate thresholds at which to split is made somewhat arbitrarily. Furthermore, plants within the same group are constrained to have the same absorptive capacity, a tenuous assumption in view of the substantial heterogeneity exhibited across plants (Girma 2003).

The second approach is to linearly interact a proxy for absorptive capacity with the FDI variable of choice. Such a proxy can be R&D intensity (Kinoshita 2001) or initial level of technology gap from the frontier (Girma et al. 2001; Griffith et al. 2002). The first two confirm that the parameter capturing the degree of spillovers increases in the measure of absorptive capacity, whereas Griffith et al. (2002) report that establishments that are further behind the technology frontier experience higher catch-up rates. A limitation of this modeling strategy is that the linear interaction term places the a priori restriction that spillovers are monotonically increasing (or decreasing) with absorptive capacity. But it may be the case that a certain level of R&D intensity is needed before firms benefit from FDI-generated externalities. Or conversely, firms above a certain level of initial technology may not, at the margin, gain much from multinational activity in their sector. To overcome this problem Girma (2003) applies threshold regression techniques of Hansen (2000). These characterize technology transfer as a non-linear process where the impact of FDI could either be negative, positive or neutral depending on some critical values of the absorptive capacity distribution.

Girma and Görg (2002) also allow for a quadratic relationship between absorptive capacity and FDI spillovers. They find a U-shaped relationship between absorptive capacity and spillovers from FDI in the region, and an inverted U-shaped relationship outside the region.

There is also a corresponding uncertainty regarding policy prescriptions for host countries that aim to maximize the benefits from foreign direct investment. Judging from the early results, soliciting foreign investment and subsidizing foreign firms (for example, by offering tax holidays or import duty exemptions) may be rational from the point of view of the host country. Foreign direct investment appears to be an important channel for the transfer of modern technology to local firms, but the amount of FDI may be sub-optimal in the absence of policy interventions because the spillover benefits are not internalized in the foreign firms' rates of return. The policy conclusions suggested by the latter studies are different. Analysis of Cantwell (1989) implies that general subsidies to foreign investment – and attempts to benefit from TNCs in the development of new industries – are not likely to pay off. Instead, governments (particularly in small countries) should concentrate their efforts in areas where their firms are already competitive. In a similar vein, Kokko (1994) suggests that FDI promotion should not focus on sectors where advanced technology, differentiated products and scale economies are likely to lead to the emergence of foreign enclaves. Instead, selective support to local firms, aiming to improve their capability to identify and employ modern technologies, seems to be a necessary ingredient in a policy package to maximize the technological externalities from foreign direct investment (Kokko et al. 1996).

Girma and Görg (2002) suggest that host country policies may be targeted at enabling domestic firms to build up their absorptive capacity through providing incentives for training and R&D in domestic firms. Also, at a more general level, policies may be aimed at providing the necessary stock of human capital in the economy through appropriate education and training policies in order to upgrade general skills.

5.3 Econometric specification

The accumulation of knowledge is one of the key determinants of economic growth. The stock of knowledge or technology can be increased by investment in R&D or by the diffusion of existing technology. Innovations generated by R&D activities and technology spillovers from the stock of existing knowledge are both important in enhancing firms' productivity as well as being closely related to each other.

In this study, I introduce R&D investment as a proxy for local firms' efforts to increase its technology level and herewith its absorptive capacity to a set of conventional variables that

reflect impact of foreign investment. The hypothesis I test is that the technology spillovers to local firms take place only when local firms make efforts to invest in knowledge (or R&D) capital so as to facilitate adoption of new technology from foreign investment.

Following the approach of Kinoshita (2000), a twofold impact of R&D on productivity is estimated:

- 1) direct impact of R&D investments as enhancement of a firm's innovative activity, and
- 2) investment in R&D as enhancement of firm's absorptive capacity for productivity spillovers from foreign direct investment.

Following the most of the recent literature in this field, for example Aitken and Harrison (1999) and Haddad and Harrison (1992), I specify a Cobb-Douglas production function (in logs) with externalities of the following form:

$$\log Y_{it} = C + \alpha_1 \log M_{it} + \alpha_2 \log L_{it} + \alpha_3 K_{it} + \alpha_4 R \& D_{it} + \alpha_5 FS_Plant_{it} + \alpha_6 FS_Sector_{jt} + \alpha_7 D_t + \alpha_8 f_j + \varepsilon_{it} \quad (1)$$

where Y is the real output, M is the use of materials and energy, L is the number of employees and K is the stock of capital. As noted by Aitken and Harrison (1999), once controlled for inputs, the parameters of all other explanatory and control variables can be interpreted as total factor productivity elasticities.

To analyze the direct impact of R&D on productivity growth, I include R&D variable as total factor productivity elasticity. The variable is approximated by intangible assets since it should present an accumulation of investments in patents, trade marks etc. If R&D activity contributes positively to productivity growth, α_4 is expected to take positive sign.

Besides innovative role of R&D, in the focus of this study is FDI as an engine of the productivity growth of a firm. Foreign investment can be considered here as the inflow of advanced knowledge from foreign firms. In particular, among many channels through which foreign knowledge spills over to a country, FDI is one of the most effective forms of international technology transfer because FDI can convey not only technology embodied in goods and services but also intangible assets such as managerial skills or in other words technology embodied in human capital that would not be transferred through other avenues.

Although there are several channels how local firms and economies can benefit from FDI, it is, however, difficult to distinguish one from the other since the mechanism of technology spillovers from FDI is complex and mostly interdependent.

I use two variables that reflect the degree of technology spillovers through foreign direct investment. The first variable is foreign ownership dummy FS_Plant_{it} for the firm i at the time t . The past studies often use this variable as a proxy for intra-firm technology spillovers from FDI. FS_Plant_{it} has value of 1 if firm received any foreign capital, and 0 otherwise.

The second variable is FS_Sector_{jt} , which proxies foreign presence in the sector j measured as the weighted share of employment by foreign-owned firms to total employment within the industry. It reflects sectoral foreign stock at the time t in the j industry to which the firm i belongs. This variable is considered to measure the degree of intra-industry technology spillovers from FDI.

In the above specification, R&D and foreign investment variables are estimated as independent total factor productivity variables influencing the output. However, investment in R&D might also affect the extent of technology spillovers from FDI by increasing a firm's capacity to absorb new technology more effectively. Griffith et al. (2000) distinguish the two faces of R&D – innovation and enhancement of absorptive capacity. They examine the two roles of R&D in explaining the productivity convergence of 13 OECD countries at the industry level. They find innovative and absorptive R&D equally important. They indeed find evidence that R&D not only stimulated innovation but also facilitated the imitation of others' discoveries.

The current study also addresses this issue by relating R&D to the size of technology spillovers. Equation (1) is extended into the following form:

$$\begin{aligned} \log Y_{it} = & C + \alpha_1 \log M_{it} + \alpha_2 \log L_{it} + \alpha_3 K_{it} + \\ & \alpha_4 R \& D_{it} + \alpha_5 FS_Plant_{it} + \alpha_6 FS_Sector_{j(i)t} + \\ & \alpha_7 (R \& D_{it}) FS_Plant_{it} + \alpha_8 (R \& D_{it}) FS_Sector_{j(i)t} + \alpha_9 D_t + \alpha_{10} f_j + \varepsilon_{it} \end{aligned} \quad (2)$$

where α_4 measures the direct effect of investment in research and development, while α_7 and α_8 measure the impact of enhanced absorptive capacity on productivity growth through technology spillovers.

5.4 Data

The data used in this study constitute an unbalanced panel with annual information on more than 8000 manufacturing firms in five transition countries: the Czech Republic, Hungary, Poland, Romania and Bulgaria. The period covered are years 1993 through 1999 (for Hungary from 1994 until 2000). The data have been retrieved from the financial database AMADEUS. In addition to standard financial information, the database gives details on a number of variables such as firm's equity ownership position, industry classification and region in which the firm is registered.

Table 5.4.I shows most important summary statistics for 1999 according to ownership. Foreign firms are defined as firms with any foreign share in the total capital²⁶. Average firm's sales, which approximate firm's output, are in all countries several times higher for foreign firms than for their domestic counterparts. Number of employees shows that the panel covers foremost middle-size enterprises with average number of employees not exceeding 800 employed persons. In contrast to sales figures, the difference in average employment in foreign and domestic firms turns out much more moderate, what indicates a higher productivity of foreign firms. The higher productivity in foreign firms may partially be explained by higher average capital stock, measured by tangible fixed assets, i.e. by higher capital intensity.

²⁶ This did not make any significant difference in total number of foreign firms compared to mostly used 10 per cent threshold suggested by OECD definition of foreign direct investment.

Table 5.4.I Summary statistics according to ownership for 1999

	No of firms		No of employees		Sales		Capital stock		R&D	
	Dom	For	Dom	For	Dom	For	Dom	For	Dom	For
Czech Republic	1277	273	427 (734)	712 (1674)	14567 (40792)	55622 (233860)	6532 (29531)	23903 (70853)	135 (823)	465 (2460)
Hungary	747	442	413 (1211)	439 (868)	23769 (144292)	58301 (305501)	8052 (74734)	25188 (191068)	229 (1767)	581 (5354)
Poland	2159	381	432 (714)	615 (871)	22792 (120148)	65910 (136725)	10407 (75315)	20600 (43410)	161 (1149)	509 (2272)
Romania	1381	604	558 (1125)	554 (975)	4112 (18102)	7568 (20811)	2584 (22943)	4073 (23279)	36 (311)	125 (981)
Bulgaria	1447	164	282 (623)	540 (848)	2403 (9539)	15360 (68314)	1480 (8615)	7186 (16682)	6 (97)	62 (359)

Note: Variables are mean values. Standard deviations are in parentheses. All financial variables are expressed in thousands US\$.

5.5 Estimation results

Table 5.5.I presents the results of OLS regressions with innovative R&D and two foreign variables. The dependant variable is $\log Y_{it}$. The coefficient of R&D measures a direct impact of R&D investment on productivity growth (innovative R&D) as opposed to its learning character (absorptive R&D). All regressions include the intercept and changes in inputs. As expected, the coefficient for R&D variable is positive and statistically significantly different from 0 for all five studied countries. Higher R&D investments go along with higher output.

Variables FS_Plant and FS_Sector represent spillover within the firm and within the industry, respectively. FS_Plant is an ownership dummy and, if foreign joint venture has any effect on productivity growth, its coefficient is expected to be positive. This variable reflects the demonstration effect and possibly includes the linkage and training effects of technology spillovers from FDI. FS_Sector is a proxy for foreign presence in the industry measured as weighted employment share of foreign firms to total employment in industry. It reflects demonstration and competition effects.

Table 5.5.I: Innovative R&D and FDI

	Hungary	Czech Republic	Poland	Romania	Bulgaria
R&D	.022*** (.006)	.009*** (.002)	.084*** (.007)	.019*** (.005)	.079*** (.008)
<i>FS_Plant</i>	.071*** (.02)	.028*** (.008)	.35*** (.035)	.199*** (.017)	.245*** (.032)
<i>FS_Sector</i>	.0003 (.001)	.001* (.001)	.011*** (.002)	-.001 (.001)	.008** (.004)
sector dummies	yes	Yes	yes	yes	Yes
time dummies	yes	Yes	yes	yes	Yes
N	1507	5499	2573	2503	2579
adjusted R2	.92	.96	.74	.93	.85

1) Dependent variable = change in log of output (sales)

2) Intercept, changes in inputs are included in regressions

3) Standard errors are in parentheses. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

According to regression results foreign capital in a firm has positive impact on firm's productivity. The impact of foreign presence in industry is however less distinct. While for the Czech Republic, Poland and Bulgaria the coefficients are positive and statistically significant, those for Hungary and Romania are insignificant. Such an outcome can be interpreted as negative impact of competition on productivity of local firms since a higher concentration of foreign firms in industries pose a stronger competition pressure on other firms in the market.

Ambiguity of the results make safe to say that technology spillovers from FDI are not automatic consequences from the more presence of foreign firms. If there are any spillovers, then they are conditional on some factors endogenous to the recipient firms or industries. The reaction of local firms at the entrance of foreign firms depends first of all on characteristics of those domestic firms, foremost on their ability to learn and adapt. Therefore, I introduce two

new variables as interaction term between R&D variable and both foreign share variables. The interaction terms reflect the “absorptive R&D”, i.e. learning ability of the firms. Regression results are presented in Table 5.5.II. The introduction of interaction terms changed only little the estimation results. Innovative R&D remains positive and statistically significant for all countries except for Romania. Minor differences in the impact of foreign share variables can be observed. The coefficients with interaction term $R\&D \times FS_Plant$ are statistically significant for Hungary and Romania. The sign of correlation is however negative for Hungary and positive for Romania. The evidence on the impact of absorptive R&D on the degree of intra industry spillovers from FDI is ambiguous. It seems that absorptive R&D can not affect considerably the degree of productivity spillovers from foreign direct investment.

Table 5.5.II: Innovative and absorptive R&D and FDI

	Hungary	Czech Republic	Poland	Romania	Bulgaria
R&D	.042*** (.013)	.012*** (.003)	.072*** (.009)	.011 (.007)	.093*** (.015)
<i>FS_Plant</i>	.089** (.038)	.008 (.016)	.438*** (.076)	.189*** (.024)	.214*** (.045)
<i>FS_Sector</i>	.003 (.002)	.002*** (.001)	.006** (.003)	.000 (.002)	.008** (.004)
$R\&D \times FS_Plant$	-.004 (.009)	.003 (.003)	-.023 (.017)	.009 (.008)	.007 (.017)
$R\&D \times FS_Sector$	-.001* (.0004)	.000 (.000)	.001** (.000)	.000 (.000)	-.001 (.001)
Sector dummies	Yes	Yes	Yes	Yes	Yes
Time dummies	No	No	No	No	No
N	1507	5499	2573	2503	2579
Adjusted R2	.92	.96	.74	.93	.85

1) Dependent variable = change in log of output (sales)

2) Intercept, changes in inputs are included in regressions

3) Standard errors are in parentheses. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

I divide the sample by ownership into local and foreign firms in Table 5.5.III. Former results hold for local firms in most countries (except for Romania). The impact of innovative R&D is strong and positive while the impact of absorptive R&D is mostly negative or insignificant.

Table 5.5.III Absorptive capacity in local and foreign firms

	Hungary		Czech Republic		Poland		Romania		Bulgaria	
	Local firms	Foreign firms	Local firms	Foreign firms	Local firms	Foreign firms	Local firms	Foreign firms	Local firms	Foreign firms
R&D	.103*** (.015)	-.028 (.022)	.016*** (.003)	.009 (.005)	.101*** (.011)	.044* (.027)	.003 (.007)	.038*** (.014)	.096*** (.017)	.101*** (.035)
<i>FS_Sector</i>	-.006*** (.002)	-.001 (.003)	.002** (.001)	.001 (.001)	-.001 (.003)	.014** (.006)	-.0001 (.002)	.002 (.004)	.013*** (.004)	-.009 (.009)
<i>R&D*FS_Sector</i>	-0.002*** (.000)	.001 (.001)	-.000 (.000)	-.000 (.000)	-.002*** (.001)	.001* (.001)	.001 (.000)	-.0001 (.0001)	-0.001 (.001)	-.001 (.002)
Time dummies	No	No	No	no	No	No	No	No	No	No
N	859	648	4323	1176	2102	471	1625	878	2142	437
Adjusted R2	.92	.92	.96	.97	.73	.69	.93	.93	.84	.85

1) Dependent variable = change in log of output (sales)

2) Intercept, changes in inputs are included in regressions

3) Standard errors are in parentheses. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

5.6 Conclusions

On an unbalanced panel of firm level data for five transition countries: Hungary, the Czech Republic, Poland, Romania and Bulgaria I test the hypothesis that absorptive capacity of a firm increase the productivity spillovers from foreign direct investment in that firm or its industry. In the analysis I distinguish between the two characters of research and development investment: R&D as investment in innovation and as investment in firms learning ability or knowledge absorptive capacity. The absorptive capacity is specified as an interaction term between firm's investment in R&D and foreign presence variable.

The regression estimates show a positive impact of investment in R&D and productivity of firms. These results are robust to all specifications. The impact of foreign capital in firm is also positive and mostly statistically significant. Evidence on productivity spillovers from foreign presence in industry is less clear-cut.

Contrary to expectations, I find little evidence for positive impact of absorptive R&D on productivity spillovers from foreign investment both in the firm and in the industry. The impact of innovative R&D is positive and statistically significant in almost all specifications (except for Romania). The absorptive R&D is mostly negative or statistically insignificant. Especially domestic firms seem to suffer from foreign presence and their R&D investment does not seem to increase their competitiveness enough to countervail against foreign competition. The comparison of R&D investment in local and foreign firms may imply that levels of R&D investment in local firms are so low that they are irrelevant as a measure of firm's learning ability. Or in other words, the technology gap between domestic and foreign firms is so large that domestic firms can not learn from foreign counterparts. Additionally, in case of big former state holdings, the R&D position in balance sheets might be nominally large but the real technology behind is much less worth or obsolete. Another explanation concerns methodological approach of the study. It implies the correlation between R&D and productivity spillovers from foreign direct investment to be linear. In fact, a quadratic function as applied by Girma (2003) would probably much better reflect the real situation allowing for the possibility that there is a minimum threshold of absorptive capacity under which firms are not able to benefit from outside knowledge, and on the other side there is a maximum technological level near technological frontier above which the productivity spillovers can not be measured either.

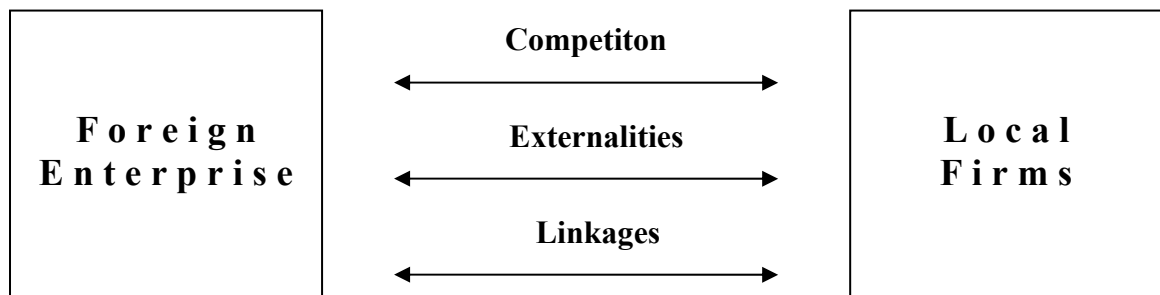
Although some vague speculations can be made on the intensity and direction of correlations studied over the five countries, still no generalization of results is possible. It seems safe to say that consequences of foreign direct investment in host countries are country specific and depend on a range of macro and microeconomic variables whose analyses leave enough scope for further research.

6 The Czech automotive industry – a success story

The interaction between foreign direct investment enterprises and local firms is threefold:

- via productivity spillovers, i.e. externalities,
- via business linkages, and
- via competition.

Chart 6.I: Interaction between foreign FDI enterprises and local firms



As presented in the previous parts of this study, the empirical evidence for positive spillovers is scarce despite a huge number of attempts and sophistication of thereby employed econometric tools. This strengthens the opponents of foreign direct investment claiming that negative market stealing effect is main feature of the impact of entry of foreign firms in local markets. Some studies suggest that this might be especially the case in less developed and transition countries due to large gap to technology frontier and low absorptive capacity of indigenous firms, for example Glass and Sagi (1998). Indeed there is some evidence for demand shrinking for domestic products at least in the initial phase of direct investment (Kosova 2004).

The list of factors affecting the impact of foreign entry on local firms is very long. To some extent we could comprise the most important FDI impact related circumstances as:

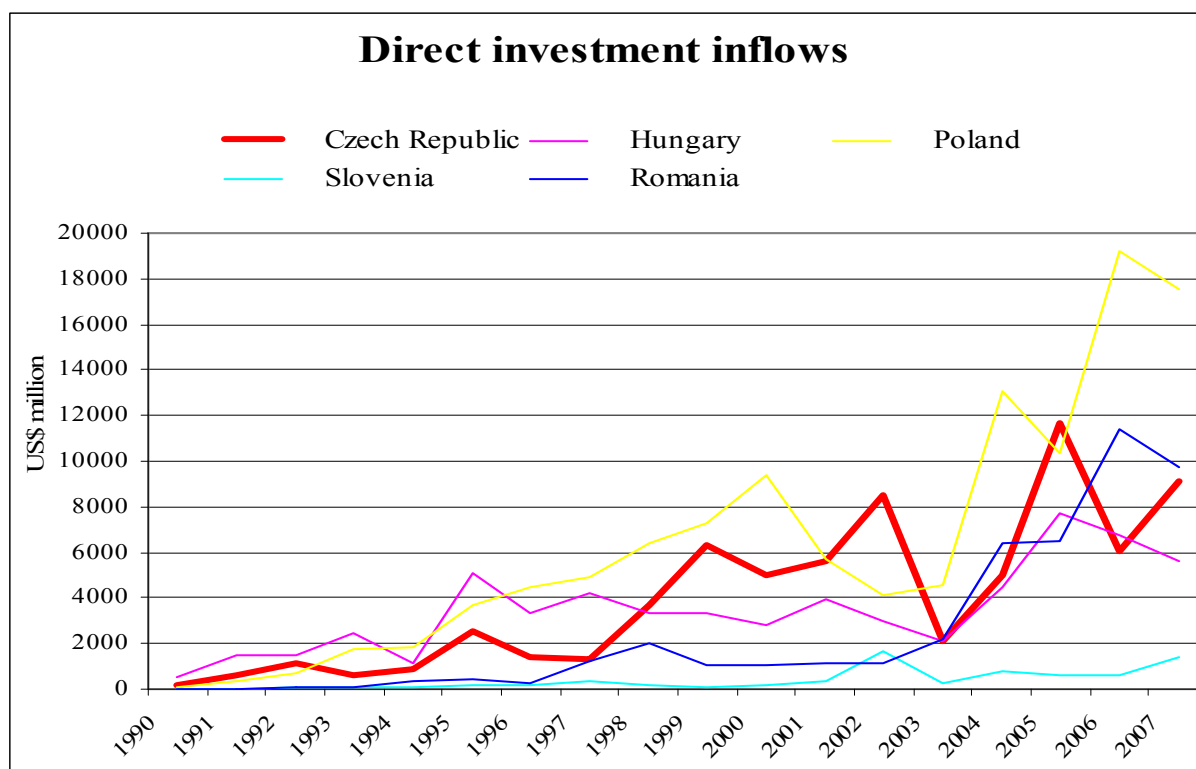
- motives and entry strategy of foreign firms,
- structure of destination industry,
- technology and absorptive capacity of local firms.

Based on the previously outlined theoretical framework, in this chapter I investigate the impact of foreign direct investment on Czech automotive sector. Respecting the long tradition of the car production in this country, post “velvet revolution” period is certainly marked by Volkswagen acquiring Skoda plants. This, at that time largest foreign investment in Eastern Europe, sparked an unprecedented example of development of an industry by foreign direct investment. This investment had an essential impact on development of not only Skoda Automobilova as FDI destination company, but the complete automotive sector and the economy as a whole.

6.1 Foreign direct investment in the Czech Republic

The Czech Republic is one of the most successful transition countries, both in terms of transition progress and received foreign direct investment.

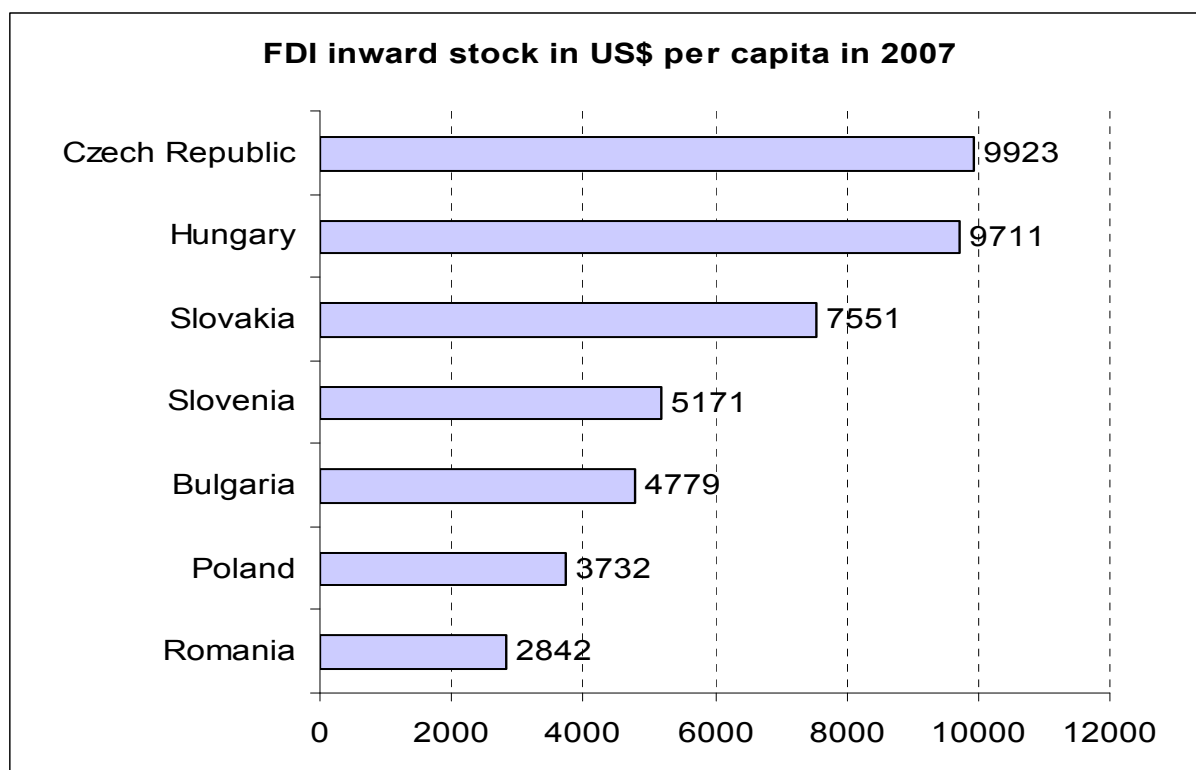
Chart 6.1.I: FDI inflows 1990-2007



Source: UNCTAD (2008)

The Czech Republic is a relatively small economy. Its attractiveness as FDI destination is more visible in per capital terms.

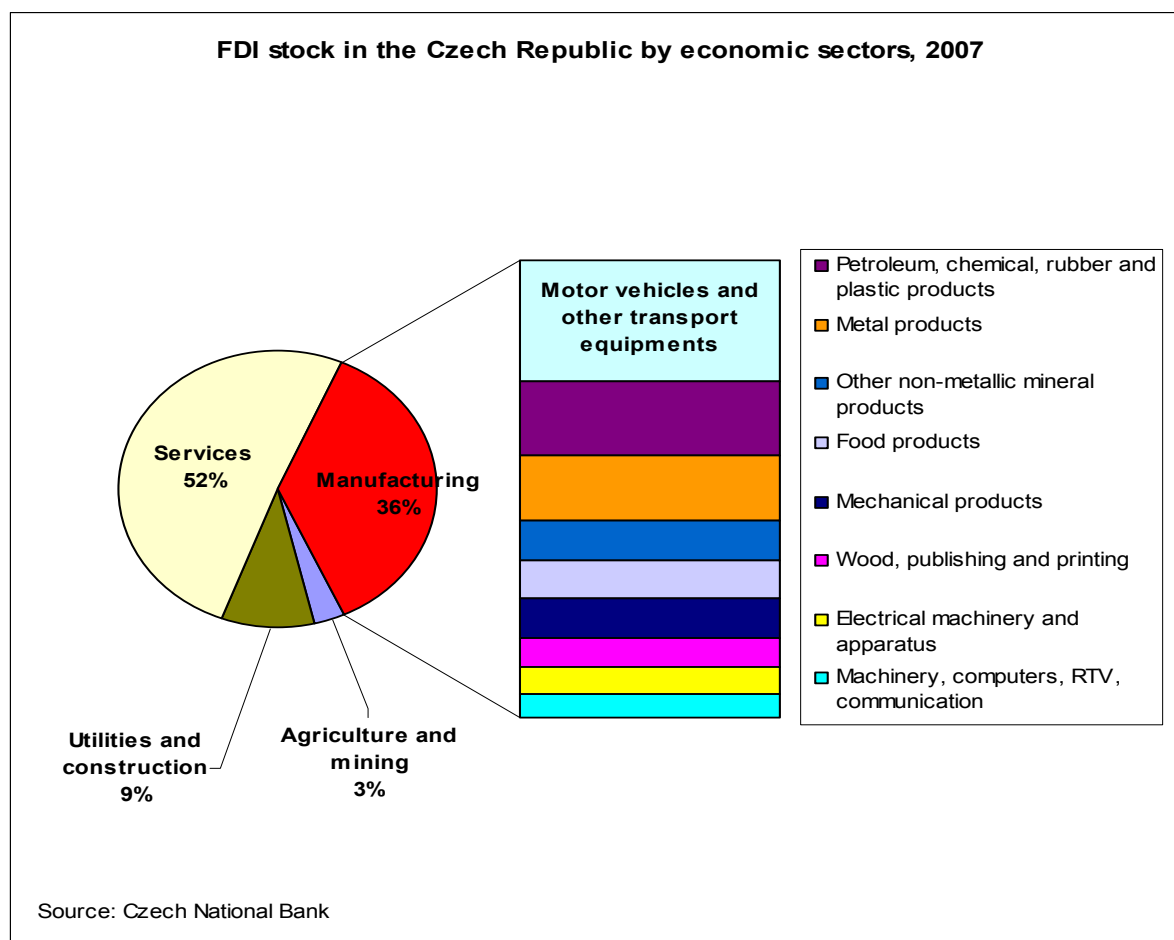
Chart 6.1.II: FDI stock per capita



Source: UNCTAD (2008)

After initial big investment projects in manufacturing industries, the privatization of large state own companies such as telecommunications and financial institutes shifted the bulk of FDI towards services and finance. At the moment, about 40% of the Czech foreign direct investment is in manufacturing. Among industries, manufacturing of motor vehicles and other transport equipment represents the largest category (about 25% of investment stock in manufacturing).

Chart 6.1.III: Distribution of FDI stock by sectors

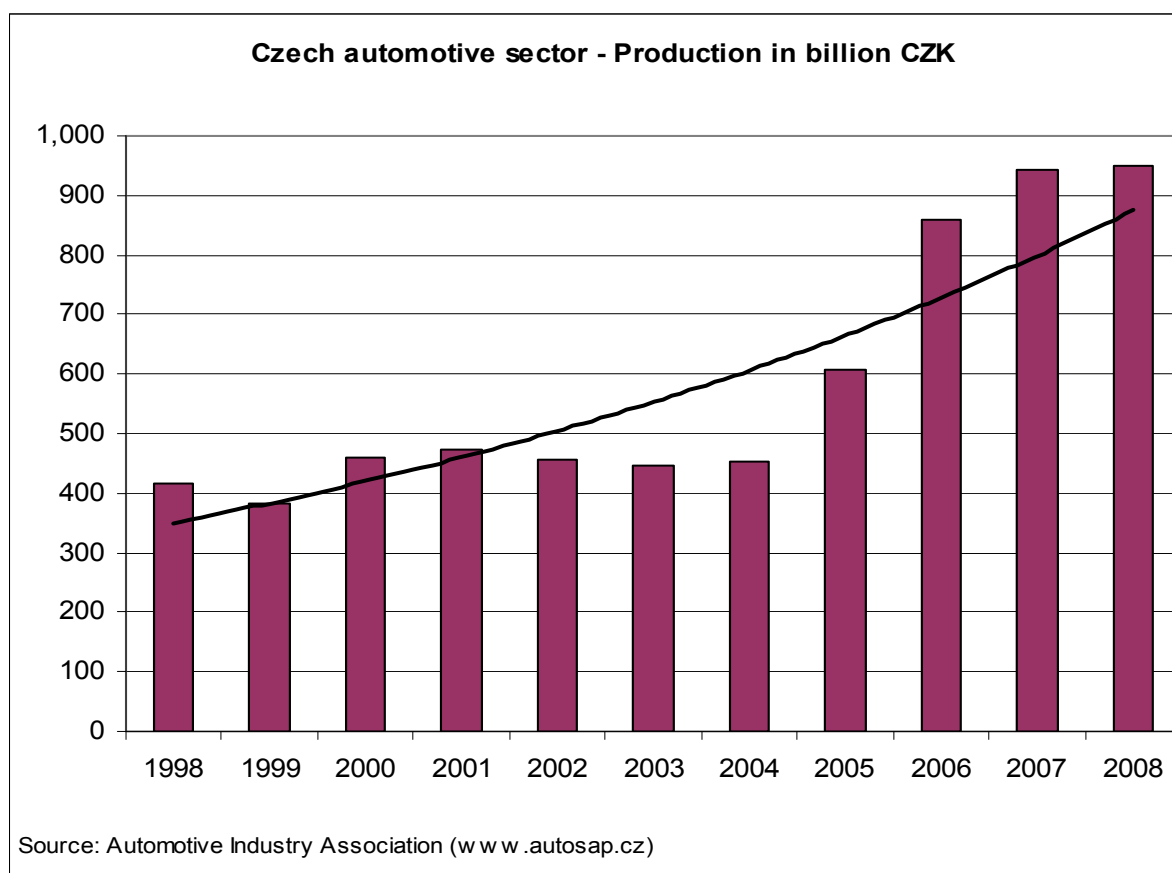


6.2 The Automotive Industry in the Czech Republic

The automotive sector is the most powerful engine of the Czech economy at the moment. The automotive cluster generated by massive investments of foreign car producers and the car component suppliers is one of the prime drivers of the Czech economy, accounting for 20.2% of manufacturing output.

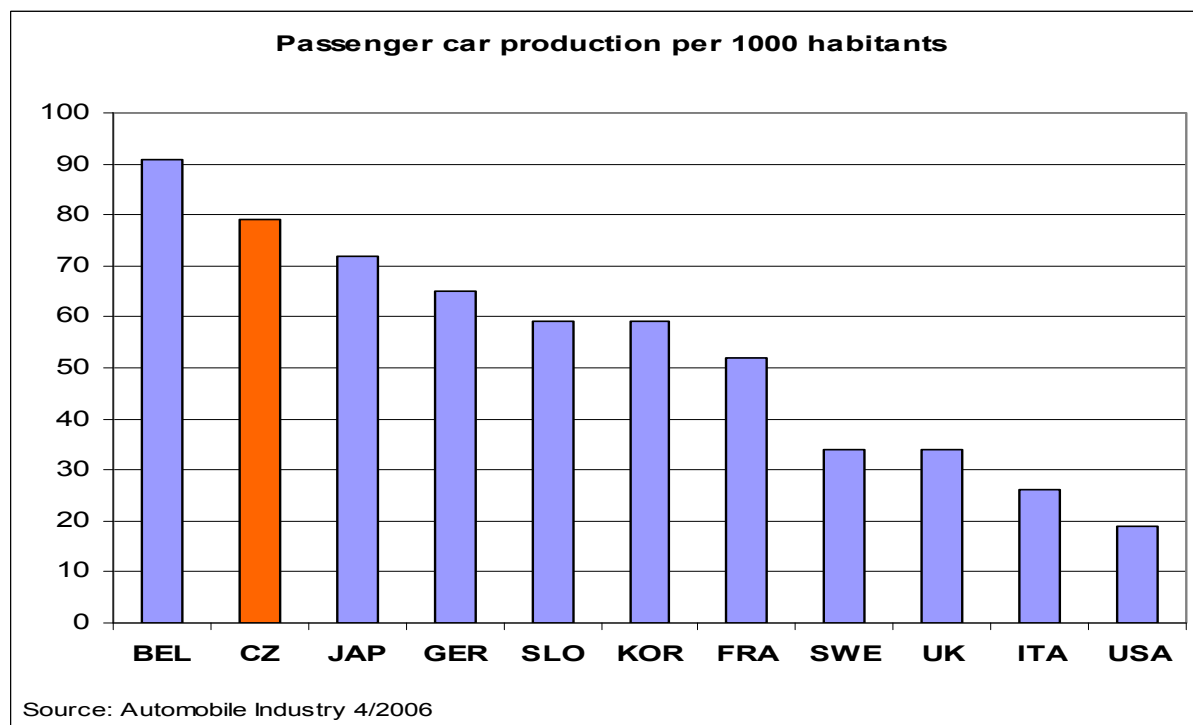
Czech automotive industry developed dynamically after 1992, when Volkswagen bought a 70% stake in Skoda Auto. Production increased at an average annual rate of more than 30% in 1995-1997.

Chart 6.2.I: Czech automotive sector – annual production



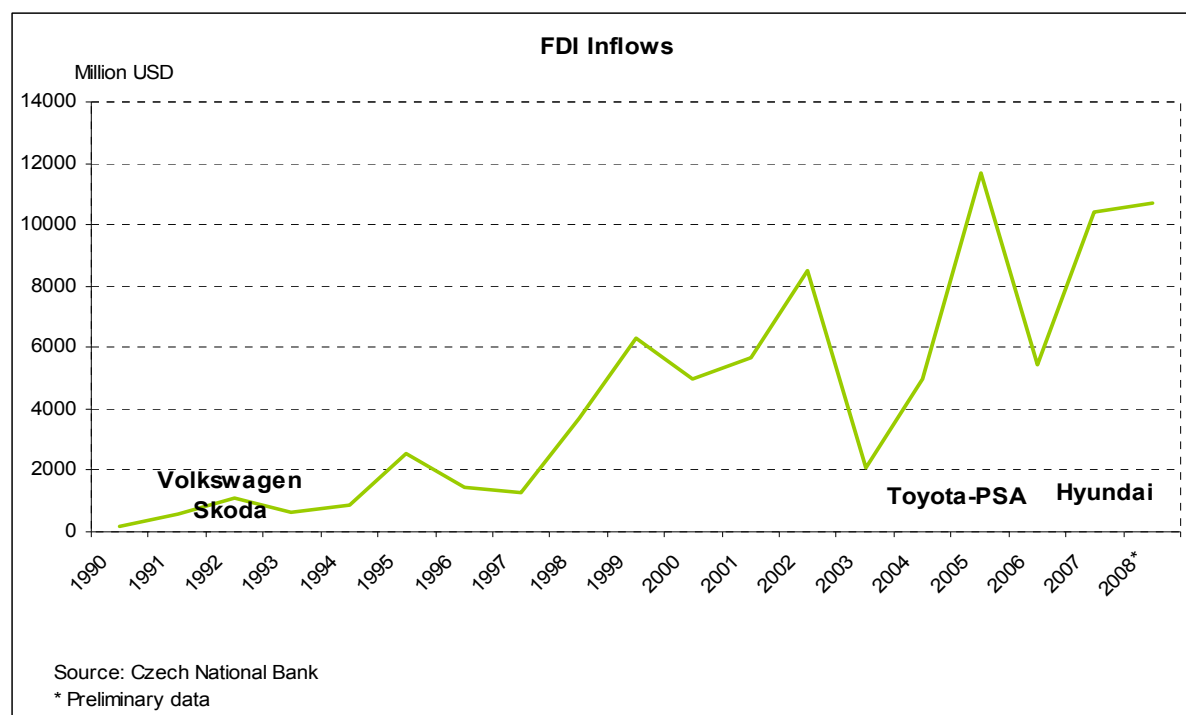
In per 1000 habitants terms, the Czech Republic ranks as the second car producer worldwide.

Chart 6.2.II: Passenger car production



Foreign automotive companies have been attracted to the Czech Republic by low labor costs coupled with an abundance of skilled manpower, geographic proximity to major automotive markets and investment-friendly government policies. Government has provided many incentives to attract investment into the industry, including corporate tax relief for up to ten years and the provision of low-cost building land.

Chart 6.2.III: Foreign direct investment in the Czech Republic



The Volkswagen Group, which has the Volkswagen and Skoda brands among others, is the dominant automotive company, with a 55,3% share of domestic passenger car sales in volume terms in 2004. The company has the majority impact on the Czech economy: its revenue accounted for 13,2 % of GDP in 2003. The top five best-selling cars in the Czech Republic in 2004 were all Skoda models.

The French PSA Peugeot Citroën group is the second largest automotive company in the Czech Republic with a 7,8% share of passenger-car volume sales in 2004. The company formed an alliance with Toyota (Japan) in 2001 to develop and manufacture small cars in the Czech Republic. Successful models of the company included Peugeot 206 and Peugeot 307.

Ford (US) and Renault (France), the third- and fourth-largest automotive sellers in the Czech Republic, had a 4,5% share of passenger-car volume sales each in 2004.

Volkswagen also accounts for nearly all production of light commercial vehicles (LCVs) and is the second-largest lorry manufacturer. Other automotive manufacturers include General Motors (US), which builds lorries under Daewoo brand, and Karosa (Czech), which is the largest manufacturer of buses.

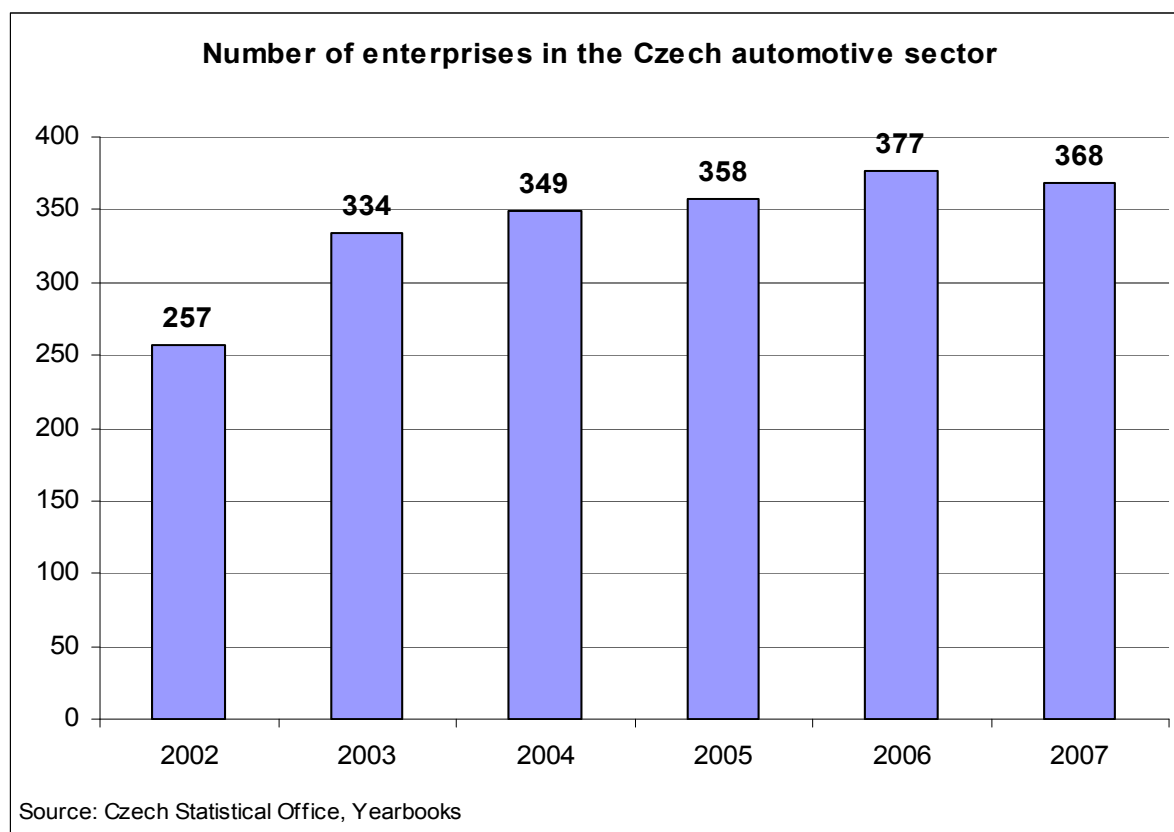
Table 6.2.I: Top automotive companies by share of passenger-car volume sales in the Czech Republic 2004

Company	Market share (%)
Volkswagen Group	55.3
PSA Group	7.8
Ford	4.6
Renault	4.5

Source: Automotive Industry Association, www.autosap.cz

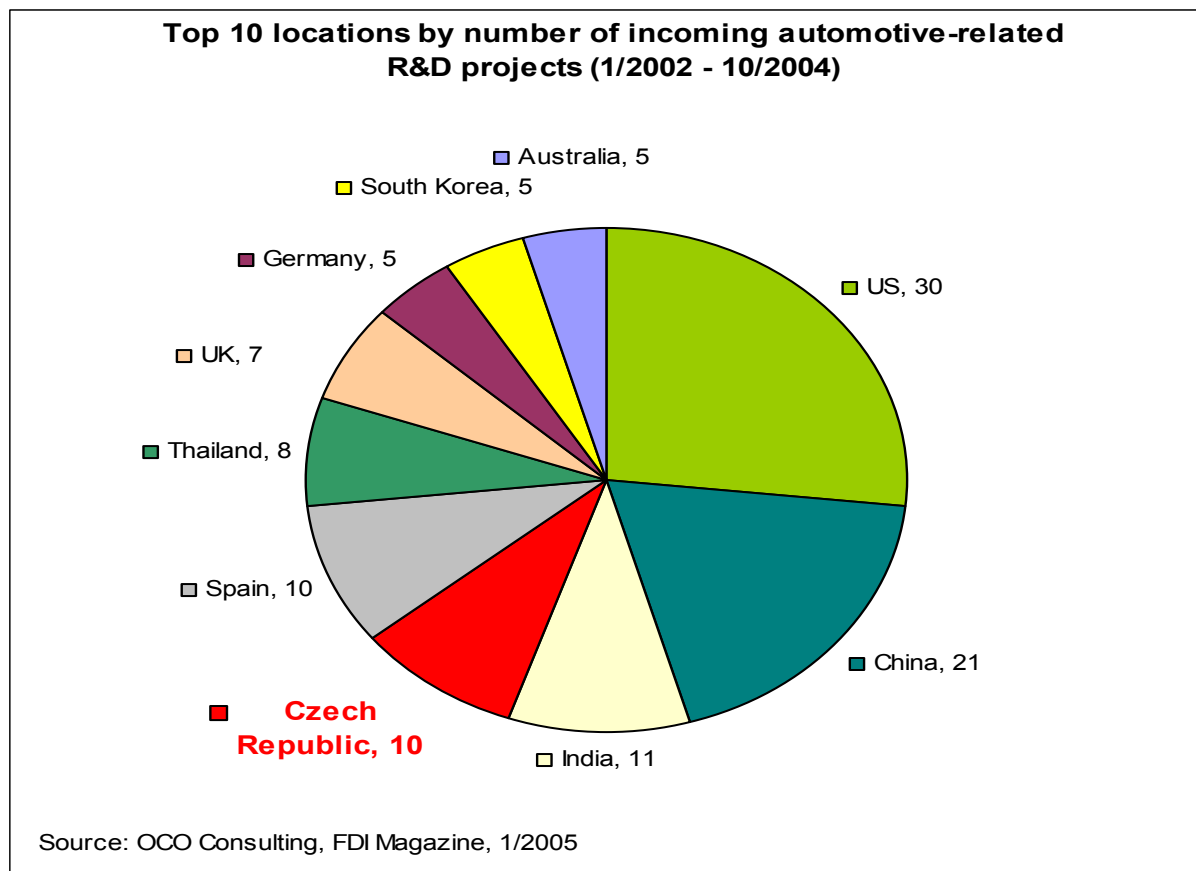
The entry of big automotive producers attracted a tier of suppliers of automotive components. About 40% of the world's top 100 automotive parts manufacturers have production operations in the Czech Republic. The Toyota Peugeot Citroën Automobile car plant (TPCA) sources 75% of components locally. Ernst & Young ranked in their "European Investment Monitor" the Czech Republic "*as the world's leading location for automotive-component plants for the last three consecutive years*" (CzechInvest 2009). The number of enterprises in the sector grew from year to year, to consolidate at some 370 firms in the recent years.

Chart 6.2.IV: Number of firms in the automotive sector



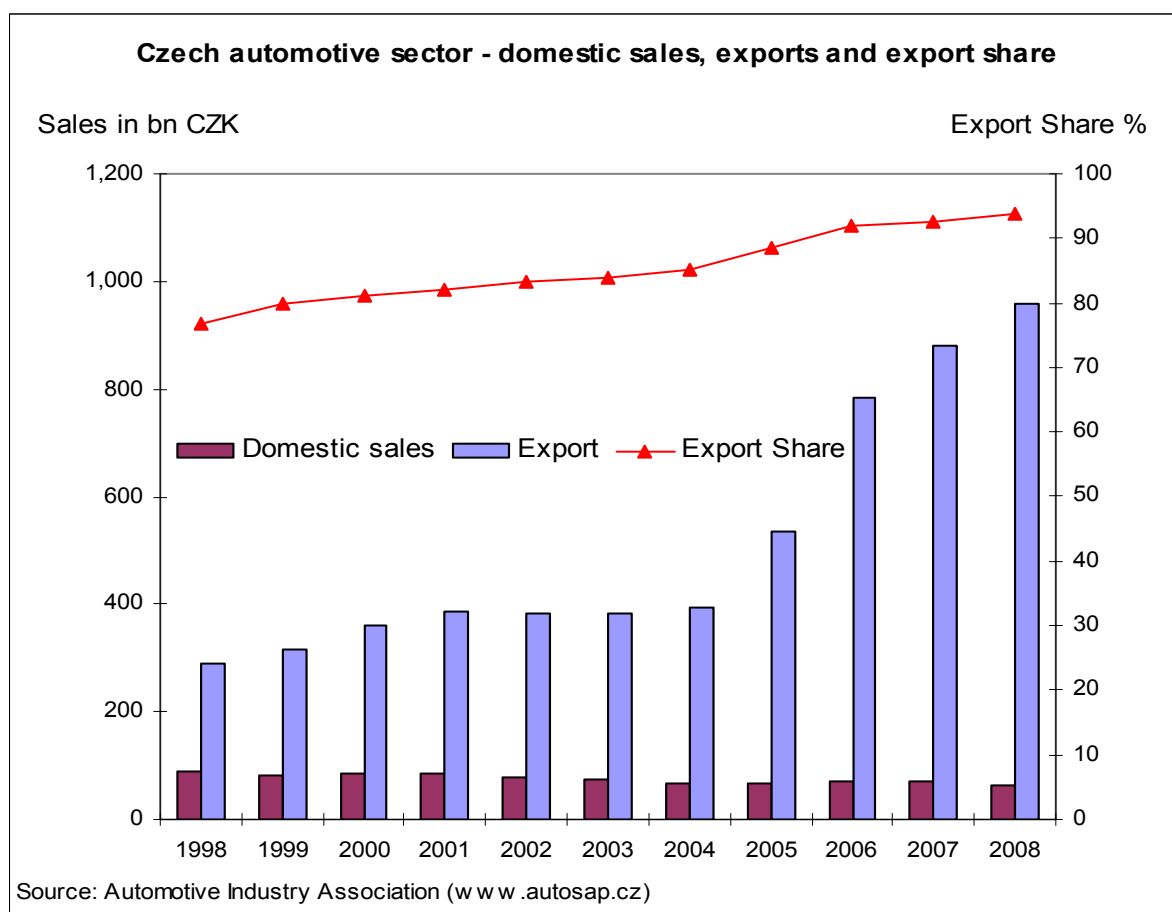
Moreover, the Czech Republic is consolidating its position as a leading European centre for automotive-related design and R&D activities. Steady supply of technical personnel by technical universities and agglomeration effects make the Czech Republic be currently the fourth most attractive automotive-related R&D location worldwide.

Chart 6.2.V: Top 10 locations by number of incoming automotive-related R&D projects (1/2002 – 10/2004).



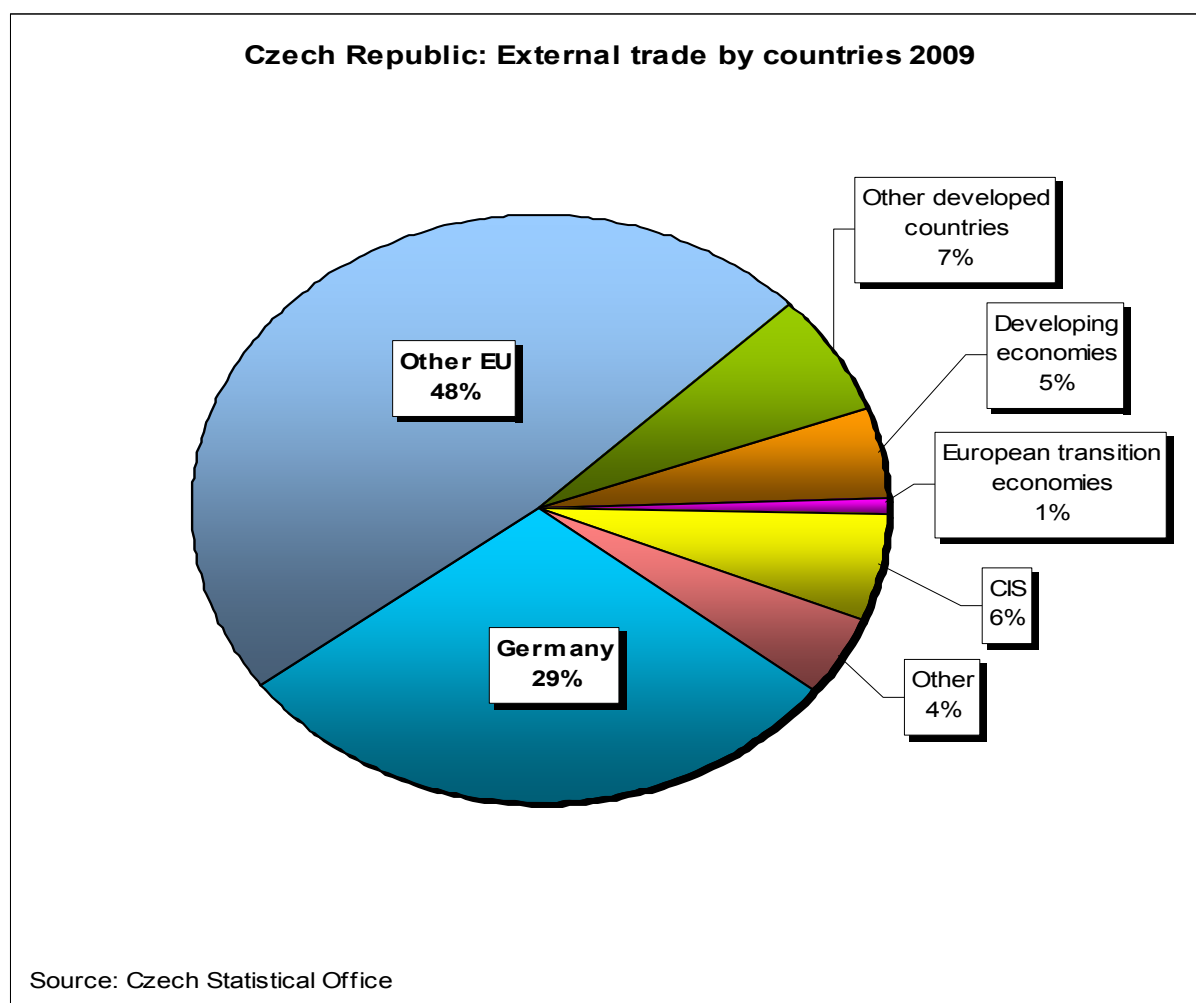
Production is oriented towards export, with about 87% of domestic production being sold abroad. Automotive exports constitute about 23% of all Czech exports. Key export markets are Western European countries (especially Germany) and the Middle East (CzechInvest 2009).

Chart 6.2.VI: Exports, domestic sales and export share



Export share of over 90% indicates a strong dependence of Czech automotive sector on development of foreign car markets, especially Western Europe. In 2007, the total number of newly registered passenger cars in Western Europe fell (-8.4%) down to the level of 13.6 million units. The financial crisis had a fundamental impact on market volumes in Spain (-27.6%, year-on-year), Italy (-13.4%) and the UK (-11.3%). The passenger car market in France maintained its level from the past year (-0.7%) thanks to incentives from the bonus/malus system put into place early the year. Other Western European markets such as Ireland, Sweden and Norway recorded slow down in new car registration, while light growth was seen in 2008 only in Portugal (+5.7%), Belgium (+2.1) and Switzerland (+1.4%). The biggest Western European market for passenger cars, Germany, shrunk 1.8% to 3.1 million units (Skoda Auto 2008).

Chart 6.2.VII: External trade by countries



Global financial crisis afflicted the Czech economy and automotive industry. The turmoil in the financial landscape, competition, changing consumer behavior, and regulatory pressure due to climate change are key challenges car producers face at the moment. We witness a deep restructuring of global automotive industry. It is unclear at the moment what the cratered landscape of global automotive sector will look like in the future.

The production of passenger cars and light utility vehicles went down by 23 per cent year-on-year to 205,281 units in the Czech Republic at the end of March 2009 (Automotive Industry Association, <http://www.autosap.cz>). The decrease came due to a sharp fall in demand in the second half of 2008 and early this year, in particular on European markets. This affected in particular production in Skoda Auto and Hyundai. Skoda recorded the biggest slump producing 98,036 cars, a drop of almost 82,000 units over the same quarter of 2008. The car maker reacted on lower production with a four days working week.

TPCA turned out 87,244 cars against 86,800 units in Jan-March in 2008. Hyundai produced 20,000 cars in Jan-March 2009.

Car producers hope on government economic programs in ten European countries aimed at curbing car purchases, such as German “Abwrack-Prämie”.

The production situation in the segment of lorries turned even worse, falling by 59 percent to 253 units in Q1, 2009. Avia recorded a yr/yr decrease of 78%, Tatra saw its production fall to a half or 217 cars. The number of the produced trailers and semi-trailers sank by 69 percent to 223 units.

Some segments are weathering recession better than others. Bus production grew by 5 percent to 907 units in Q1. Irisbus raised output by 9 percent to 790 buses, while domestic producer, SOR Libchavy output dropped 27 percent to 84 units.

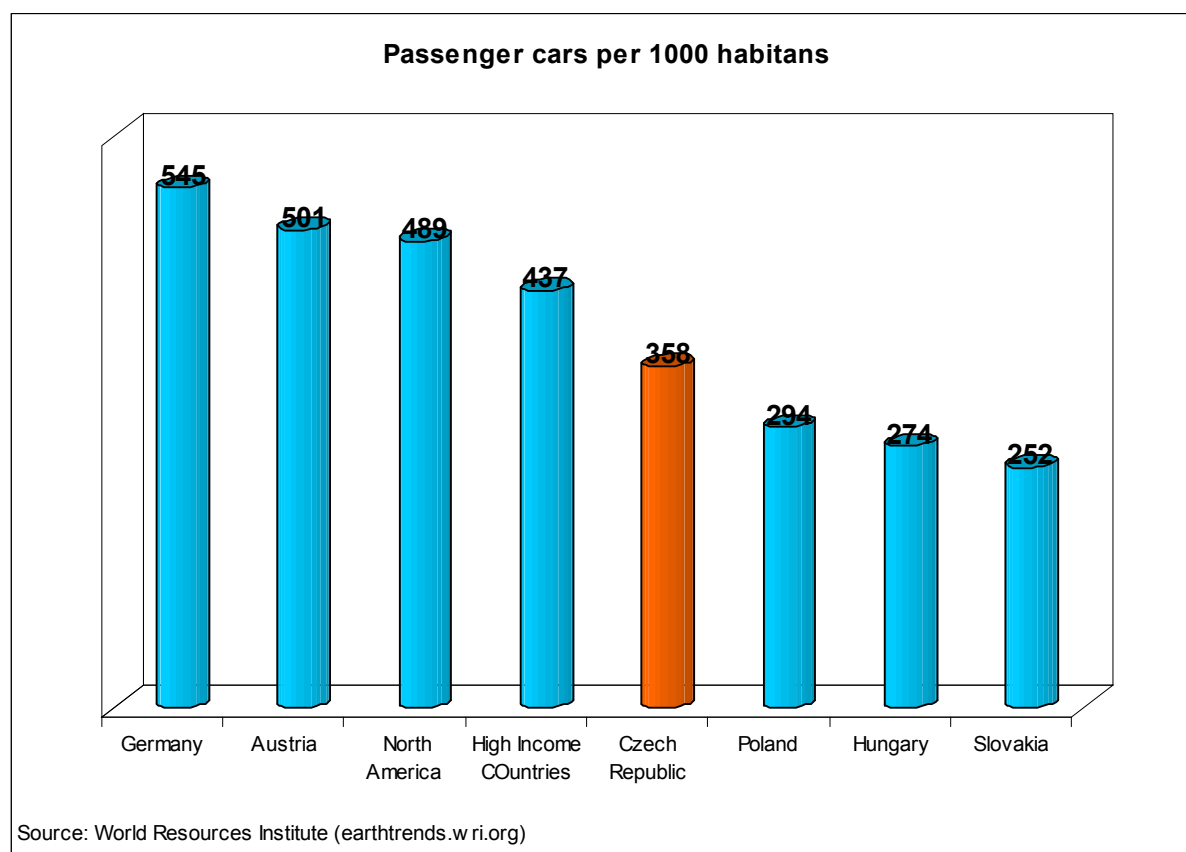
Also, the Motorcycle segment recorded growth of over 20% to 244 units. Most of the motorcycles were produced by Jawa which recorded a leap in production of 61 percent to 229 units (Prague Daily Monitor, 14. May 2009).

As far as domestic demand for passenger cars in the Czech Republic is concerned, we can observe certain growth potential. According to Skoda Auto (2008), domestic market for passenger cars continued with sales growth trend established in previous year. Due to the positive economic development, among other factors, the Czech Republic saw an 8.4% increase in new passenger car registrations, with total sales of 144 thousand units. Global economic slowdown showed up only by the end of the year. Demand for light commercial vehicles fell 3.3% in 2008 to 60 thousand units. The passenger car market was heavily influenced by ongoing growth in used car imports, 231 thousand of which were registered during the year (up 8.5% year-on-year). As a result, the proportion of used vehicles to overall registrations reached 61.7% (Skoda Auto 2008, p. 33).

Total passenger-car ownership has risen by 45% from 239 per 1,000 population in 1991 to an estimated 358 per 1,000 in 2003 (see chart below). This level of ownership is far above that of neighboring Visegrad countries (Poland, Hungary and Slovakia), each of which have

estimated figures of car ownership of about 250 per 1,000. However, the level is still below rates of 400-500 per 1,000 that are typical by developed countries, reflecting the Czech population's lower disposable income. Disposable income is however expected to grow due to sustained GDP growth.

Chart 6.2.VIII: Passenger cars per 1000 habitants



Characterizing the Czech Republic as one of vulnerable European FDI countries, Ernst & Young still suggest that automotive sector and electronics, previous FDI drivers in FDI hotspots such as the Czech Republic, Slovakia or Turkey, are likely to resume that role in the future (Ernst and Young 2009).

6.3 Joint venture Volkswagen – Skoda

6.3.1 History – Skoda, the world's third-oldest car maker

One of the most important for the Czech economy and at the time the largest foreign direct investment project in Eastern Europe, was the acquisition of the traditional Czech car manufacturer Skoda through German Volkswagen. The economic analysts estimate that over the period 1991 – 1995 over 30% of foreign direct investments in the Czech economy were invested in Skoda and its suppliers.

The dramatic changes following the Velvet Revolution of November 1989, especially the transformation from centrally planned to market economy as well as the opening up to world markets, made clear that the Skoda's survival was possible only by huge investments in modern technology and business know-how. Already by the end of 1980s Skoda was looking intensively for an international partner. Long industrial tradition, a fairly creditable exports to the West (45,500 cars sold in 1989) and positive balance sheet coupled with location-related considerations resulted in bids made by no less than twenty companies (Dobosiewicz 1992). However the field was quickly whittled down to only two: Volkswagen und Renault.

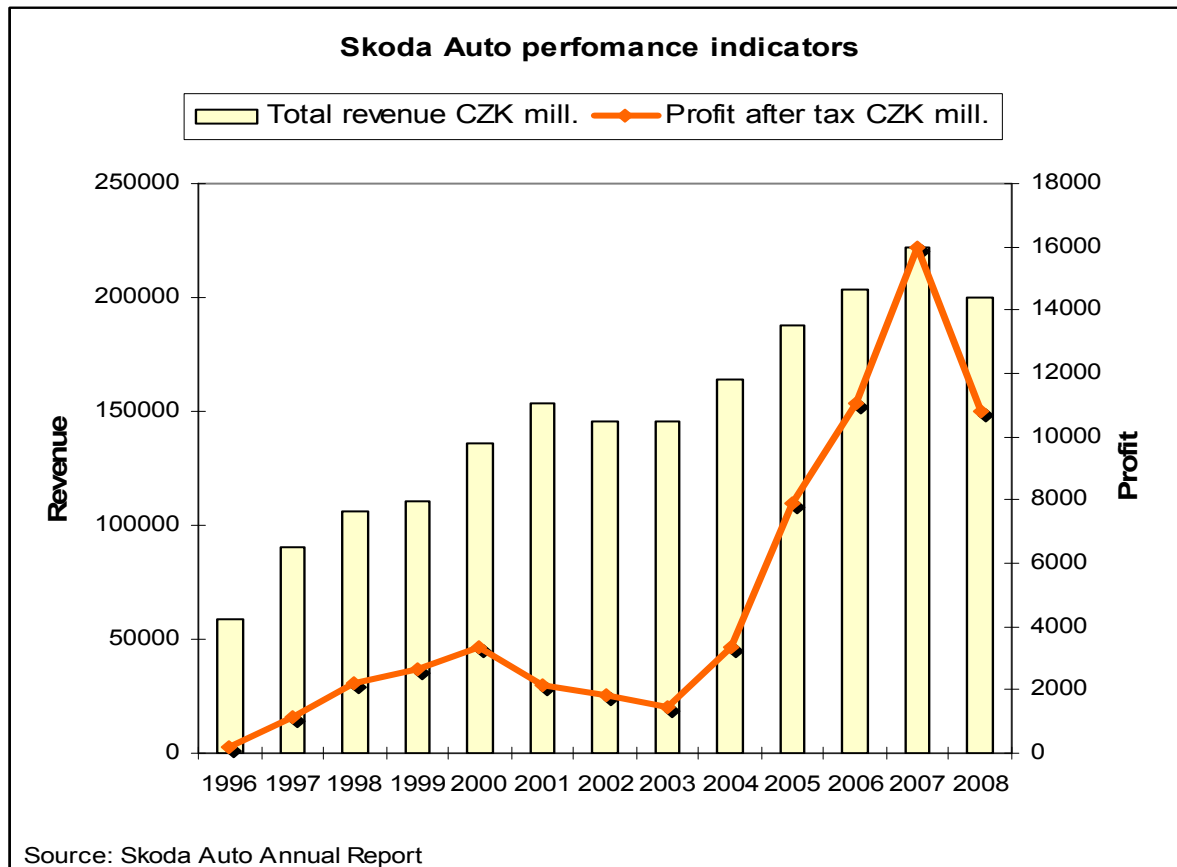
After some political disputes between the central government and the autonomous Czech Republic, in March 1991 the Czechoslovak government signed an agreement with Volkswagen. By this agreement Volkswagen will acquire a steadily growing share of the Skoda equity: from 31% in 1991 to 70% in 1995. In 2001 Volkswagen took over the remaining 30% of Skoda. In return for its controlling interest Volkswagen has to pay DM 1.4 billion and to assure the investment of at least DM 9.5 billion (6.4 billion dollars). It should enable Skoda to raise its output to 400,000 cars in 1997 and 500,000 engines by 1995. The part of the output would be exported to other Volkswagen plants in Europe.

Increased output would make it possible to avoid layoffs of labor force. Beginning of 1990s, Skoda had some 21,000 employees. Since total employment was set up to remain the same, in the case that output goals were reached this would mean a leap in production of at least 2.2 times.

6.3.2 Skoda Auto Group

Since becoming a part of Volkswagen Group, Skoda Auto has more than tripled its production, significantly expanded its product portfolio, and reinforced the Skoda brands' image (Skoda Auto 2008, p. 11).

Chart 6.3.2.I: Skoda Auto Performance



In terms of market shares, Skoda is the largest provider of passenger cars in the Czech Republic and Slovakia and one of the most important in the Central Europe as a whole. At the same time, the Skoda capture slowly but persistently the other markets. Skoda's market share reached 3% of large German market and its overall share in Western European market increased to 2.1% in 2006.

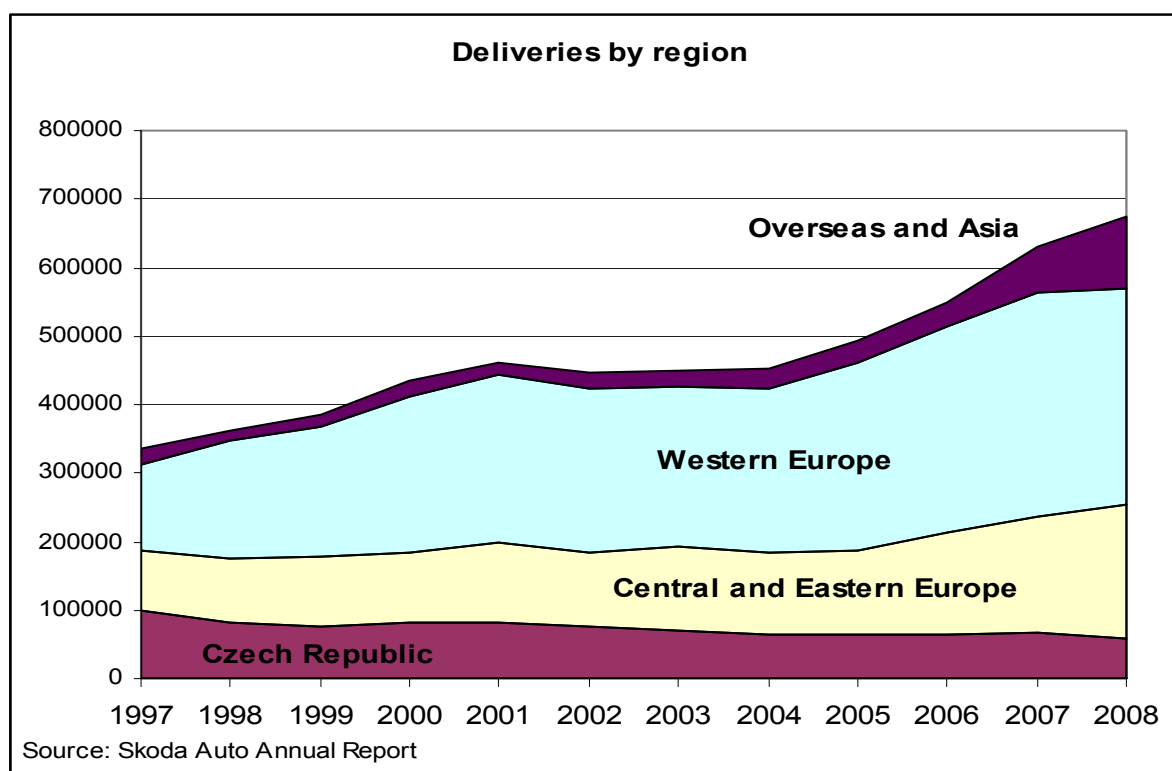
Table 6.3.2.I: Skoda market shares in %

	1999	2000	2001	2002	2003	2004	2005	2006
Czech Republic	49.6	52.6	52.6	50	47.7	48.5	51	52.4
Slovakia	53.8	57.2	52.8	44.2	44.2	40.1	36.2	36
Poland	6.6	7.9	11.2	11.1	12	12.5	11.7	12
Hungary	4.6	5.3	5.5	6.6	7.3	8.2	9	8.9
Central Europe	14.4	17.6	20.8	19.1	18.1	17.8	18.6	18.9
Germany	1.5	1.9	2	2.1	2.2	2.4	2.7	3
France	0.5	0.6	0.6	0.8	0.7	0.7	0.8	0.8
Great Britain	1	1.3	1.5	1.5	1.4	1.3	1.6	1.7
Italy	0.8	0.9	1.2	1	1	0.9	0.9	0.7
Spain	0.9	1.1	1.3	1.2	1	1.1	1.5	1.7
Austria	4.8	6.1	6.4	5.5	5.4	5	5.3	5.5
Denmark	4.6	5.3	6.3	6.3	7.4	6.9	6.3	6.6
Sweden	4.8	5	3.4	3.5	3.3	3.3	4	4.1
Western Europe	1.2	1.5	1.6	1.7	1.7	1.7	1.9	2.1

Source: Skoda Auto (2006)

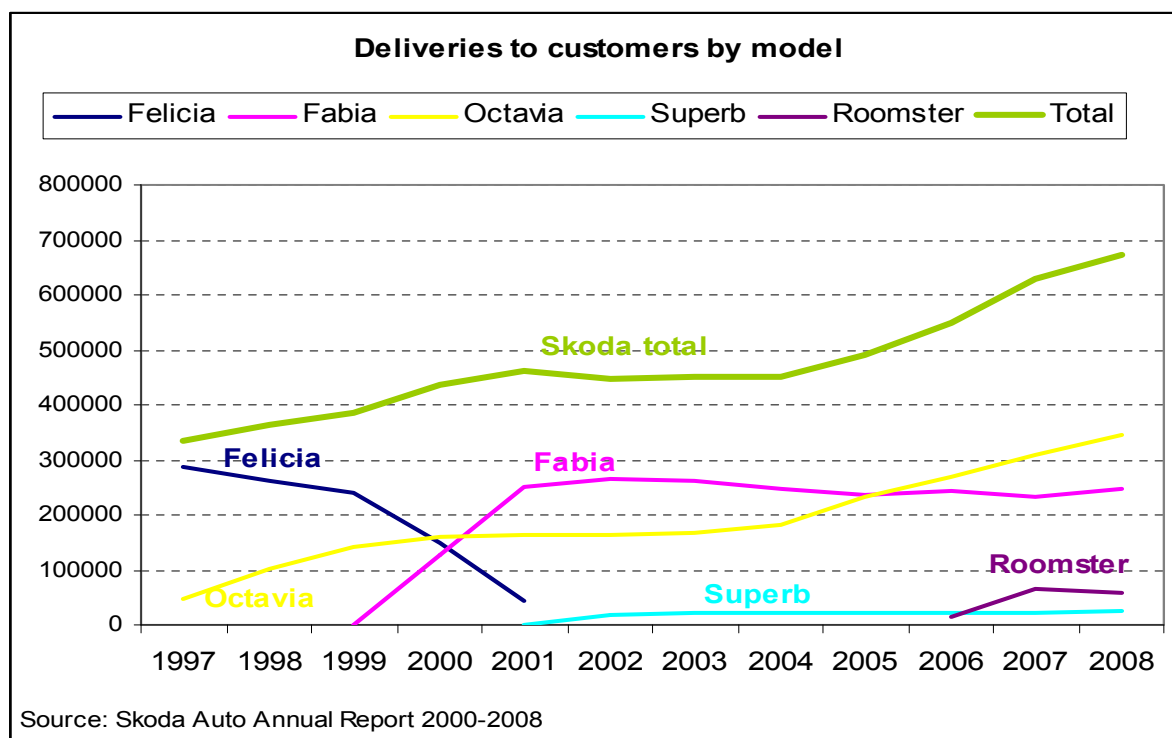
The sales in Asia and Overseas are growing at an even faster pace. Skoda Auto is one of the Czech's largest exporters; in 2007 its share in overall Czech Republic exports reached 7.5% (Skoda Auto 2007).

Chart 6.3.2.II: Skoda deliveries by region



In 1991, as Volkswagen bought 30% of shares and took over the management of the carmaker from Mlada Boleslav, Skoda produced only one model, Skoda Favorit. Over the next ten years, the number of models in Skoda's product portfolio grew steadily. Besides conquering the new markets, Skoda found its way also into new market segments like mid-range and upper mid-range class.

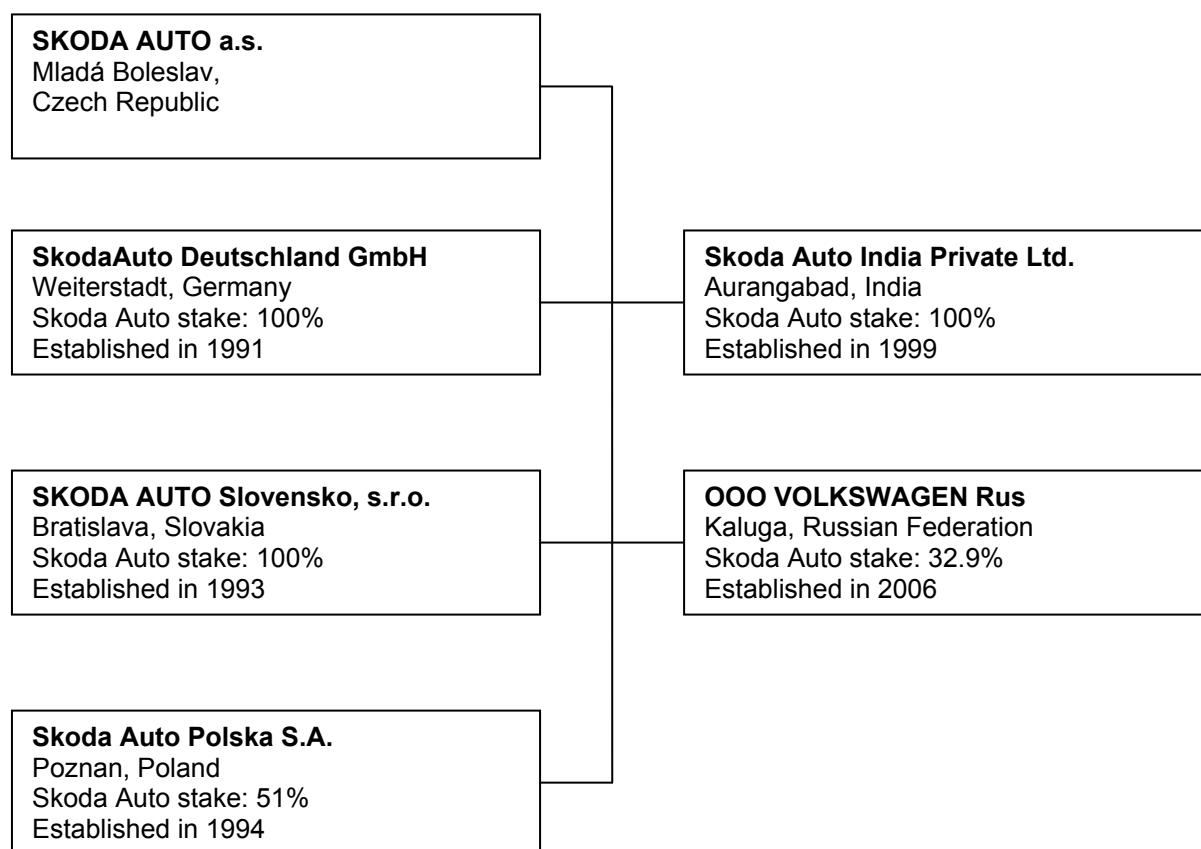
Chart 6.3.2.III: Skoda deliveries by car models



At the moment, all Skoda vehicles incorporate state-of-the-art technology such as active safety systems (ESP, ABS, EDR), Adaptive Frontlighting System (AFS), modern DSG gearboxes, navigation and telecommunication systems.

Outward direct investment projects by Skoda are mostly a part of market entry strategy. Low-income markets such as Eastern Europe and Asia (foremost China) have high strategic importance for Skoda. In 1993, Skoda opened its subsidiary in Slovakia, and one year later in the Polish city of Poznan. Assembly plant SkodaAuto India was established in 1999 and started with assembly operations in 2001. In order to enter the Russian market, Skoda Auto took a stake in OOO Volkswagen Rus in late 2006.

Chart 6.3.2.IV: Skoda Auto Group



Source: Skoda Auto (2008, p. 9)

Besides subsidiaries, Skoda Auto maintains cooperation with several partner assembly plants.

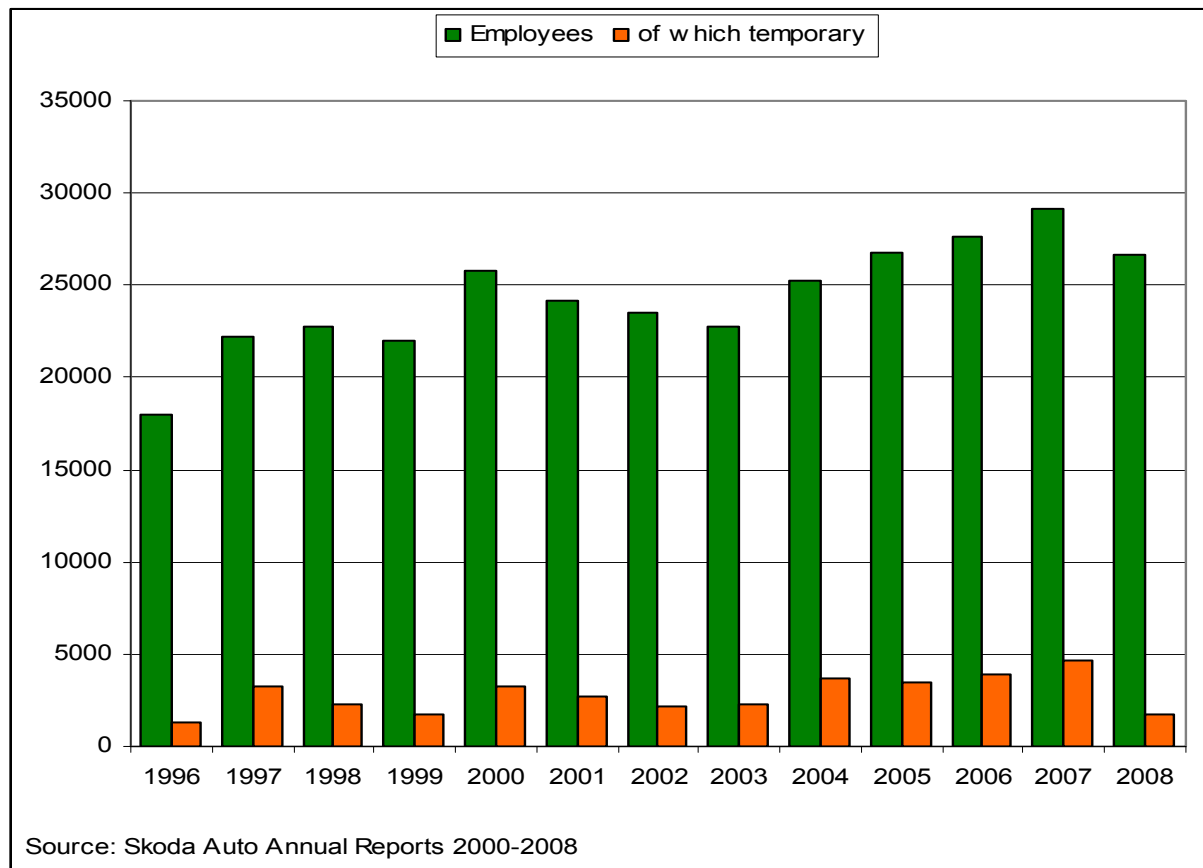
Table 6.3.2. II Vehicles Assembly / Production in Partner Plants

	2006	2007	2008	2008/2007 (%)
Bosnia and Herzegovina	2,170	2,579	2,720	5.5
Ukraine	19,013	23,337	30,172	29.3
Kazakhstan	1,124	1,557	281	-82
Slovakia	-	-	18,278	-
China	-	38,664	55,920	44.6
Total	22,307	66,137	107,371	62.3

Source: Skoda Auto (2008, p. 59)

Volkswagen met completely the obligations from the investment agreement from 1991, not only in regard to strategic objectives but also in regard to the number of employees being stable and even rising due to growing production and deliveries.

Chart 6.3.2.V: Skoda Auto – Number of employees



6.4 Linkages

According to the Skoda Auto company, important task of supplier management was to build relationship with suppliers with an emphasis on optimizing processes, quality and costs. Regular workshops with suppliers, which are also attended by the representatives of technical development and quality, provide a venue for exchanging know-how and developing new projects, as well as an opportunity to identify new standards and potentials for optimizing the material costs (Skoda Auto 2008, p. 52).

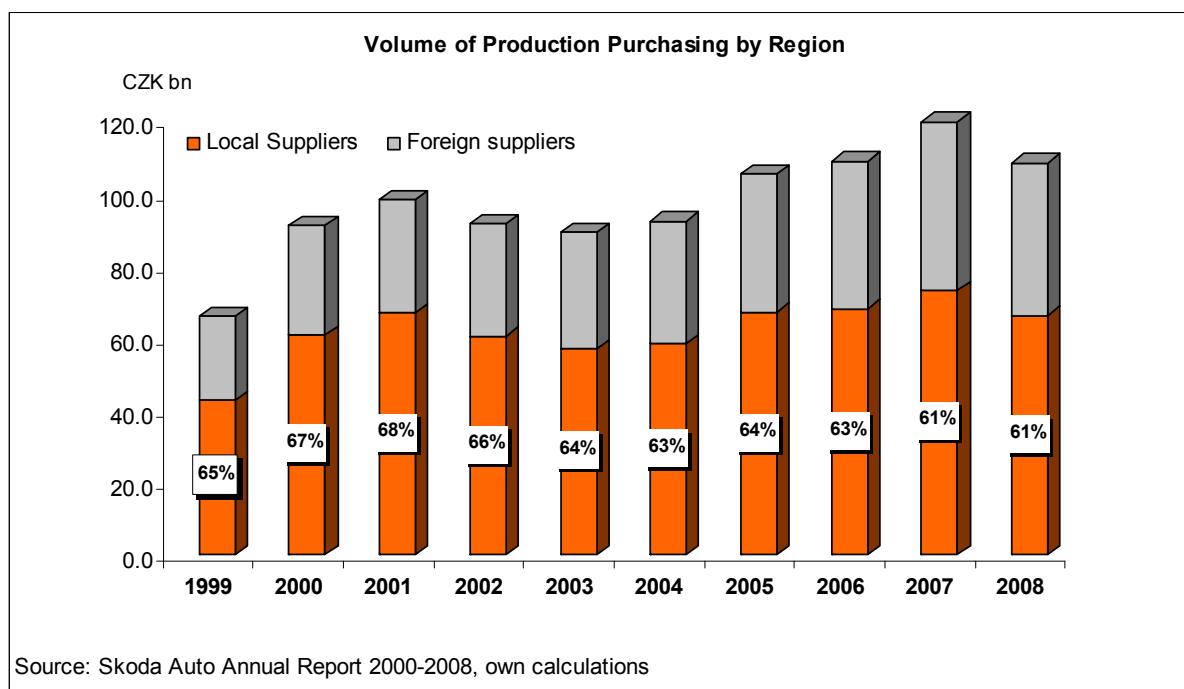
As usual for joint ventures, Volkswagen took over the upstream network of the Skoda and developed it further. Total 186 firms from the Czech Republic and 17 from Slovakia supply Skoda with almost 80% of materials and components (Nováček and Smutný 1996). The 25 biggest suppliers account for nearly one-half of overall turnover, 20 of them being from the Czech Republic.

Chart 6.4.I: Structure and number of Skoda Auto suppliers



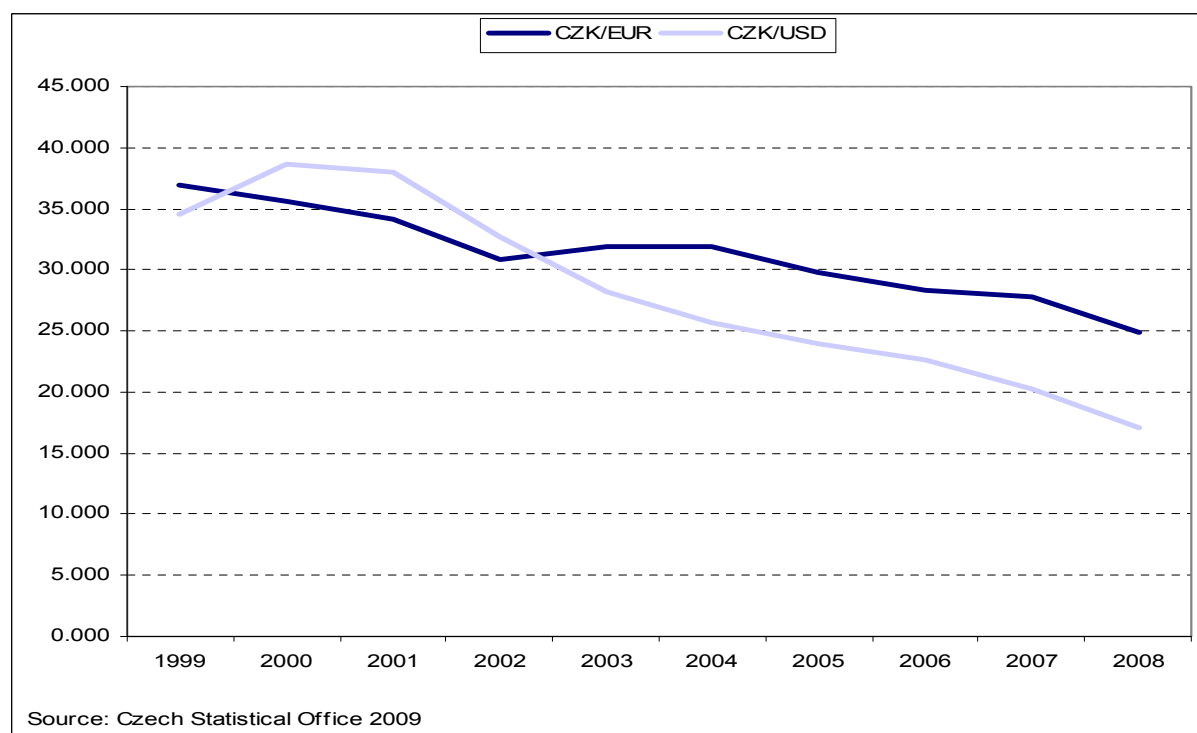
Furthermore, it has been reported that the purchasing volume for production materials increased by 38% in 2000. Domestic suppliers accounted to 66 per cent of all deliveries. Due to intensive investment activities and efforts in the field of technical development, the purchasing volume for investments and services rose by 66% to CZK 22.3 billion in 2008. Domestic suppliers accounted for 49% (some 11 CZK billions).

Chart 6.4.II: Skoda Auto – purchasing volume



The early years of this decade were characterized by strong exchange rate of the Czech crown (CZK) in relation to the Euro. This produced high cost pressure on domestic suppliers, which had to reduce costs to maintain the competitiveness of the local production sites.

Chart 6.4.III: Exchange rate CZK – EUR and CZK – USD



According to Skoda Auto, the company maintains an open and fair relationship with its suppliers. This relationship goes beyond the simple granting of production orders, but the “know-how and creativity of the supplier industry are becoming increasingly integrated into the development of product and production innovations” (Skoda Auto 2000, p. 22).

Skoda puts pressure on its suppliers in regard to quality of components. The quality grew at the fastest pace at 44 domestic suppliers, which also involved in joint ventures with foreign partners. Furthermore, foreign suppliers invested in 17 greenfield projects, that consisted about 10% of all foreign investment in the Czech economy by the middle of 1990s. This group includes the names like: Lucas-Ateso, Glavunion, Barum-Conti, Bosch, etc. Several suppliers such as Johnson, Plastimat and Lucas, decided to plant directly at Skoda location in Mladá Boleslav, which minimizes transport and logistic costs and provides for more intense cooperation and faster solution of occurring problems.

6.5 Externalities

The externalities from foreign direct investment for destination economies are comprehended mostly as positive. In this sense, I recognize two modalities of such positive externalities for destination economy and local firms in the case of Volkswagen – Skoda joint venture.

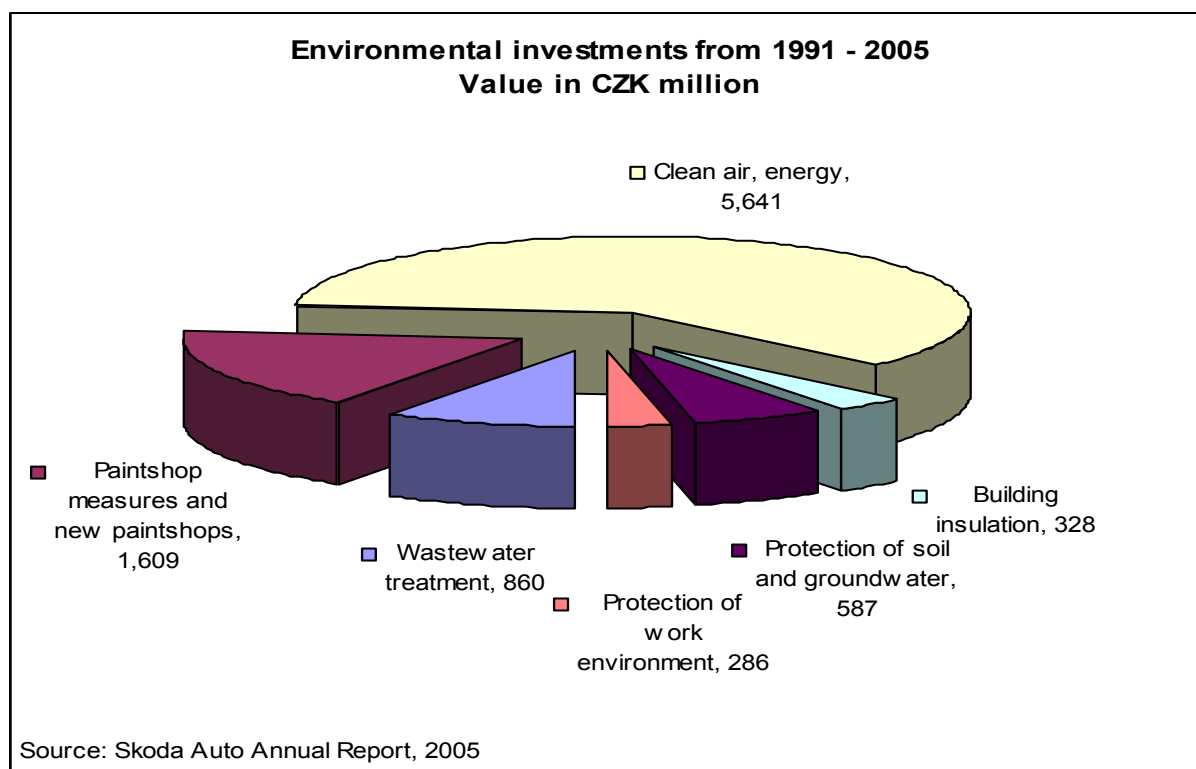
First, the evident introduction of new technologies by the Volkswagen in regard to both product and production processes in Skoda brought such modern technologies closer to local Czech firms and opened the range for demonstration effects. The concrete evidence for such externalities is difficult to find and identify, but a certain expectations of productivity improvements inspired by the activities of foreign firms is plausible.

Second, as many sources suggest, Volkswagen Group paid from the very beginning of the joint venture with Skoda a lot attention to the human resources management. Numerous activities aimed at upgrade of the human capital led to an evolution of a pool of technical and engineering expertise in the region, which enhanced further the quality of the Czech Republic as a location for automotive industry and attracted more investments.

6.5.1 Technological improvements and transfer of know-how

Right from the start of the joint venture with Skoda, Volkswagen took over the management of the new enterprise. The overall objective of both joint venture partners was bringing Skoda to the technology frontier. This comprised first of all the modernization of the final product and enlargement of the product portfolio. Since the quality of production processes is a major factor determining the quality of the resulting products, massive measure have been undertaken to transform and modernize all production facilities as well as all business functions. A lot attention has been paid to the modernization of Skoda plants in Mladá Boleslav, Vrchlabí and Kvasiny. In April 2002 the completely new plant in Kvasiny opened.

Chart 6.5.1.I: Skoda Auto – Environmental investments



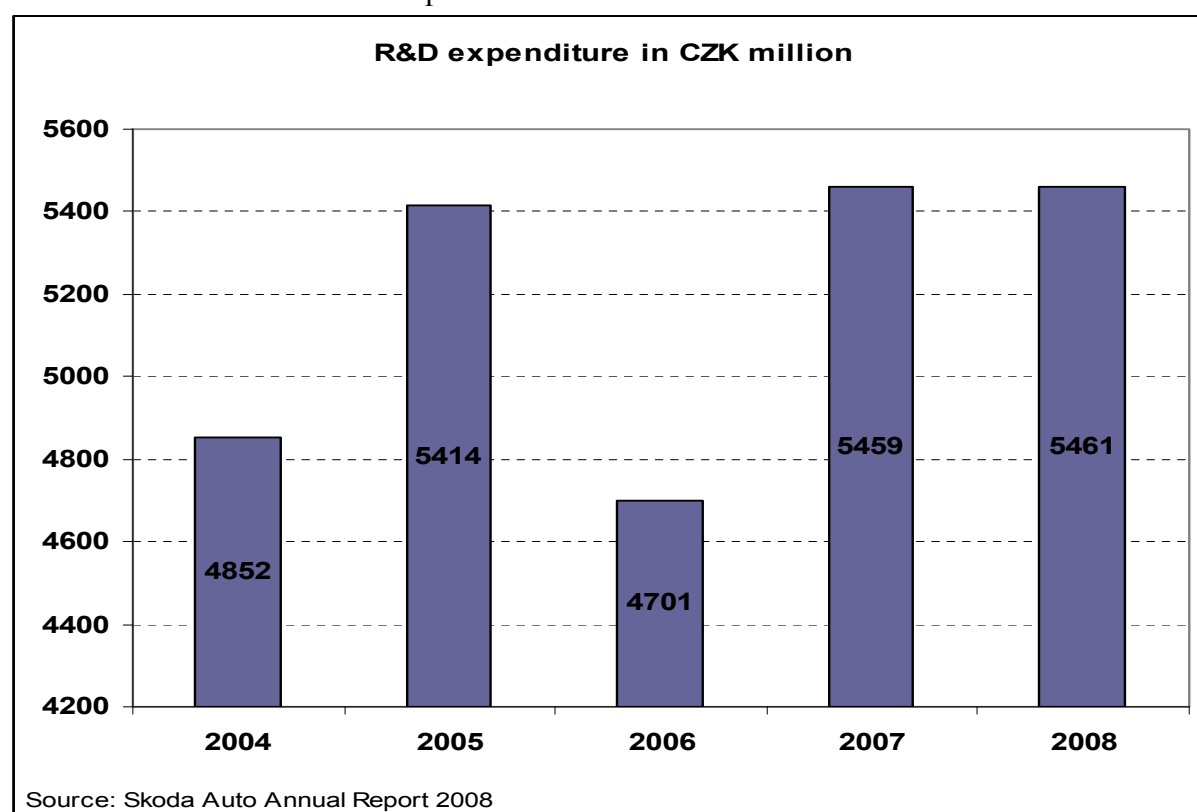
Already in 1994, Skoda introduced a certified quality management system. It comprises vehicle development quality, production process quality and quality of repair and maintenance services. In 2007, company passed an ISO 9001:2000 certification extension audit of its quality management system.

Through employment of consistent communication and database systems Skoda Auto is thoroughly integrated into the design and development structure of Volkswagen Group, which provides for further cooperation and knowledge transfer within the Group. In July 2002 Skoda Auto was named “e-Company of the Year 2001”, a prize awarded to the top company in the field of applying new information and computing technologies; comprehensive development is based on Computer Aided Design/Computer Aided Engineering (CAD/CAE), for example using the so-called finite-element methods, such as in structural mechanics or computational fluid dynamics.

In 2000, technical development employed 1229. With the opening of the new technology center, Skoda expanded its development-related floor space by over 70%. It was the major step in becoming the third largest technology center within Volkswagen Group. Thanks to an investment of nearly CZK 1.16 billion over 300 new jobs were created for highly qualified specialists (Skoda Auto 2008).

Skoda’s technical development department performs development projects also for other Volkswagen Group brands. This promotes co-operation and the exchange of experience and know-how.

Chart 6.5.2.II: Skoda Auto – Expenditures in R&D



6.5.2 Human capital management

Under the motto “Best-in-class” Skoda embarked on the ambitious project of thorough rejuvenation and redesign of product portfolio and concurrent modernization of all business functions. Several transformation strategies were discussed:

- 1) “Blaupause”: business philosophy of the holding company is “translated” in the subsidiary,
- 2) Key executive vacations occupation by expatriates,
- 3) “University Volkswagen” (off-the-job training),
- 4) Learning by doing (on the job training),
- 5) Project management (involvement of local staff in the transformation process,
- 6) Tandem management (learning by working in tandem) (Zoepf 1996).

At the end, the transformation proceeded in form of a mix of different strategies.

The key aspect in this process was the training and upgrading of human factor. The Czechoslovakia had traditionally a solid education system and technically well trained labor force. For example in 1987 40,3% of employed workers had some vocational education, 23% a high-school education and 9,1% graduated from university (Forschungsinstitut für Berufs- und Fachschulwesen 1990). However, forty years of socialism let many necessary business functions and knowledge to shrivel. In a workshop in October 1991, Czech specialists and executives and VW expatriates discussed main strengths and weaknesses of the local staff. Both agreed on strengths like qualification and operating experience, the art of improvisation and cooperativeness. The lack of personnel reviews and career chances, complex and inefficient organization, red tape and poor motivation were picked out as main weaknesses (Zoepf 1996).

Transfer of know-how in Volkswagen- Skoda was one of the most important objectives right from the start of joint venture. It took several forms. Building of tandems of expatriates and domestic employees was a broadly employed practice. Thereby, a Skoda employee is assisted by an expert from Volkswagen. All decisions have to be made together. The tandem is set up for a certain period and its objective is to qualify the local staff to work independently and to

take over the responsibility for the job. Between 1991 and 1994, 48 such tandems were set up (Gutmann 1996):

- Human resources: 1,
- Development and production: 8,
- Sales and marketing: 19,
- Bookkeeping and controlling: 12,
- Strategic management: 8.

Nováček and Smutný (1996) report about 140 expatriates from Volkswagen Germany who were working at Skoda plants in Mlada Boleslav.

SkodaAuto has concentrated its personnel marketing efforts on institutions of higher learning. Besides involving Czech universities, Skoda initiated on its own several programs for higher education.

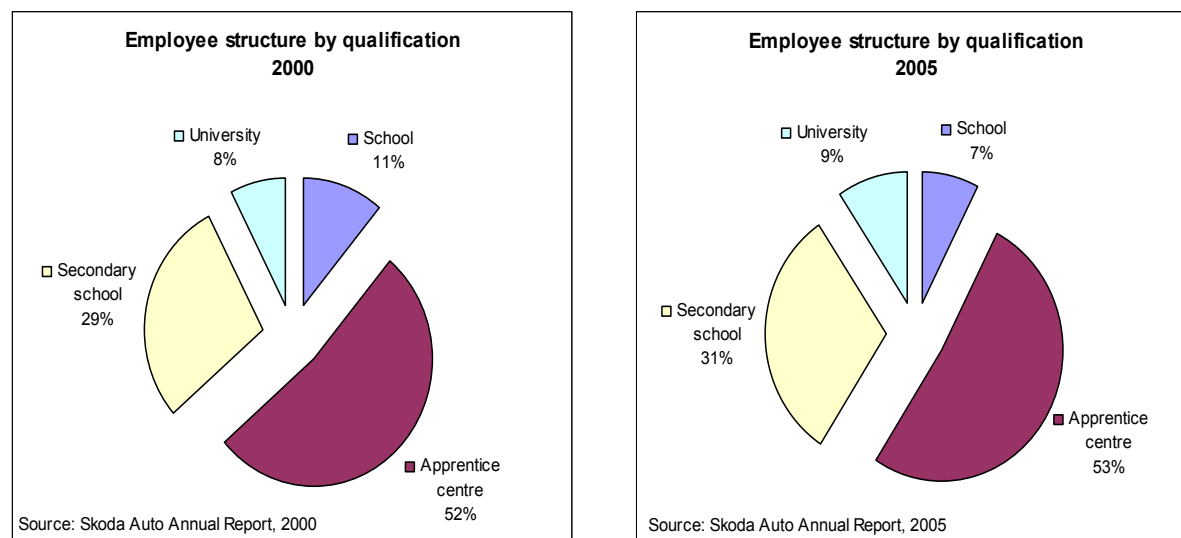
Skoda Auto University celebrated its fifth anniversary in 2005. A total of 830 students were enrolled in Bachelor's and Master's programs at the Skoda Auto University in 2008. Of this number, over 100 were Skoda Auto employees enrolled in a work-study program. At the same time, 928 future employees prepared for their future vocation at the in-house Secondary Vocational School focused primarily on mechanical and electrical engineering. Skoda Auto is sharing its know-how nationwide.

In another project named IQ Auto, over 244 secondary school teachers have undergone training at Skoda Auto since 2006, 64 of them in 2008. The objective of this initiative is to inspire the teachers in technical subjects and thereby build and support future workforce quality (Skoda Auto 2008).

In April 2000, Skoda Auto established the first private college in the Czech Republic. In November 1998, Skoda Auto and partner companies established Institute for Industrial and Financial Management (IPFM). The highly job-oriented program recruits engineers from Central European Countries.

Education efforts resulted in better education structure of employees, with growing share of higher education to the perils of lowest qualification levels.

Chart 6.5.2.I: Employees structure by qualification



Volkswagen paid a lot attention to strengthening of motivation, commitment and discipline of local staff. A number of activities have been introduced aimed at strengthening the corporate identity and commitment of the labor force. Among them a special program named E.B.R.A. has been arranged for the staff to submit improvement proposals. In 2008, a total of 5,012 employees utilized the program to file 10,046 improvements proposals. The success rate of the proposals was 67.6% and the benefits of implementing them were estimated at CZK 251.2 million.

Table 6.5.2.I: Improvement proposals

Enterprise	Improvement proposals per 1000 Employees
Porsche	3156
Opel	708
Audi	443
VW	357
BMW	306
Skoda	254
Mercedes	230

Source: Pohanka and Neubeiser (1996)

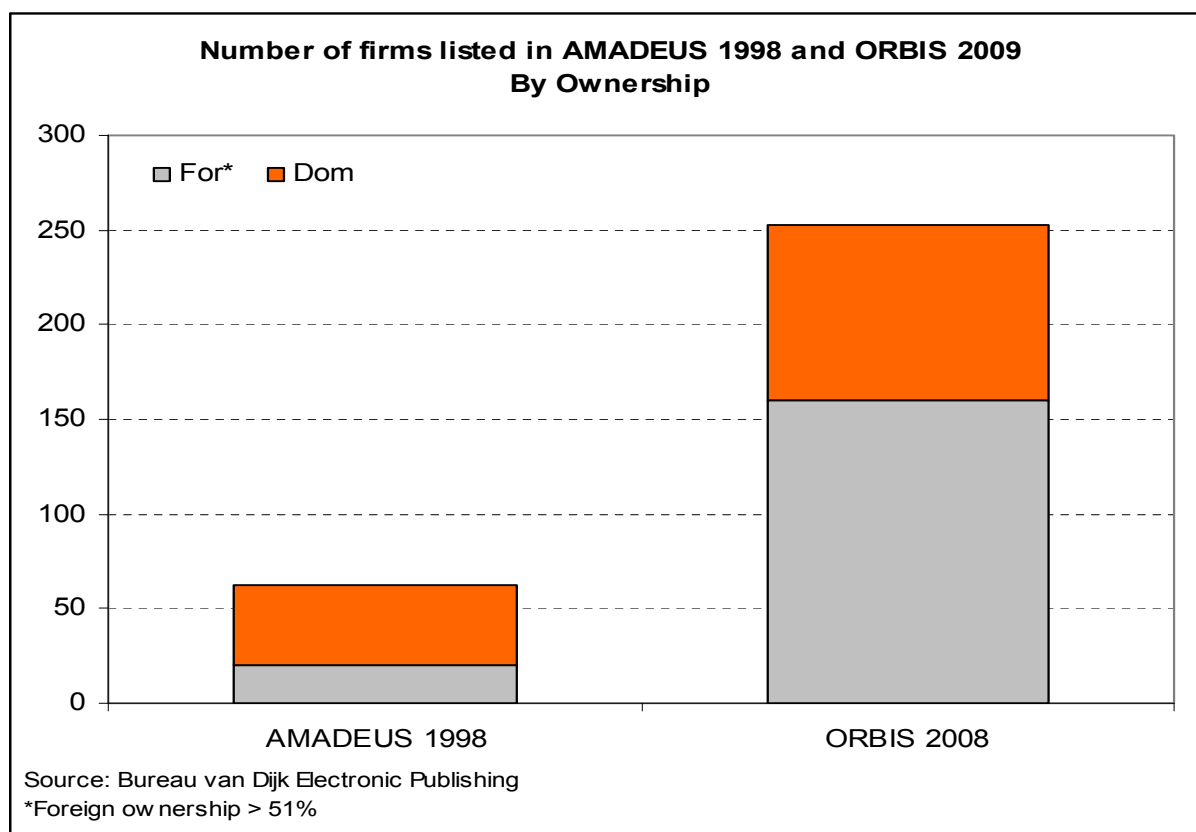
6.6 Competition

Recent impact studies of foreign direct investment incline to explain the missing evidence for positive spillovers or findings of negative productivity effects in domestic firms by the strong detrimental effect of more fierce competition caused by the entry of foreign firms. It has been argued that at least in the short run, domestic firms operating at lower productivity levels and by higher marginal costs than the foreign counterparts are forced to cut down the production, loose market shares and eventually leave the market. Kosova (2005) finds evidence for such a set-back by the domestic firms in the Czech manufacturing industries. In this part I try to assess the competition effect of entry of Volkswagen and other car and car components producing companies on the development of domestic sector²⁷.

At the beginning of 1990s, the C29 industry of NACE Rev. 2 industry classification (Eurostat 2008) – “manufacture of motor vehicles, trailers and semi-trailers” – accounted a modest number of active companies. The database AMADEUS counted some 45 companies in this category (Bureau van Dijk 2000). The number of vehicles components producers in the equivalent database ORBIS in 2009 is 190 companies (Bureau van Dijk 2009). Also the data from the Czech Statistical Office show a steady increase in number of firms in this market. The growth of this market segment is tied to the growth of the vehicle producers segment, which received ignition spark with the entry of Volkswagen in the car maker from Mlada Boleslav.

²⁷ Detailed information on domestic and foreign firms in this part are retrieved from the financial databases AMADEUS and ORBIS of Bureau van Dijk. The databases comprise wide range of company data. ORBIS covers about 60 million companies around the world, while AMADEUS is a pan-European database. The information is sourced from many different information providers as annual reports, registered filling, banks and insurance companies.

Chart 6.6.I: The motor-vehicle manufacturing firms listed in the databases of Bureau van Dijk



At the outset of 1990s the Czech automotive sector accounted several motor vehicles producers. The segment of passenger car production was dominated by Skoda Automobilova in Mlada Boleslav. The only rival in this segment was Tatra a.s.²⁸, another established vehicle producer. However, Tatra soon left the market for passenger cars and focused on manufacturing of off-road trucks. Hence, as Volkswagen entered the joint venture with Skoda, the Group faced a kind of “virgin market” in the Czech Republic.

The potential and attractiveness of the Czech economy as destination for foreign direct investment in automotive industry has been recognized recently by other world’s leading car producers. French PSA group was the second largest automotive investor in the passenger car segment. The company formed an alliance with Toyota (Japan) in 2001 to develop and manufacture small cars in the Czech Republic. Successful models of the company included the Peugeot 206 and the Peugeot 307.

By the end of 2008, Hyundai started with manufacturing in the Czech Republic, with planned production of some 300,000 cars a year.

²⁸ a.s. stands for „incorporated company“.

Ford (US) and Renault (France), the third- and fourth-largest automotive sellers in the Czech Republic, had a 4,5% share of passenger-car volume sales each in 2004.

Volkswagen realized the first mover advantages and extended its share in the Czech passenger car market to more than 50%.

6.7 Development of the domestic sector

The Czech Republic has a long tradition in manufacturing, and particularly in car production. The centrally planned economy tied with restricted external trade and consequent low competitiveness of the Czech producers let the whole industry to wither. Obsolete production facilities and outdated and poor product portfolio made clear from the very beginning of transformation that the fastest way to ensure survival and catch up with world markets for the Czech automotive companies was through the cooperation with foreign partners. Accordingly a large share of the Czech firms sought some kind of involvement of foreign investors.

Like Skoda, Tatra a.s. is another established Czech car manufacturer with over hundred and fifty years of tradition in the automotive production. The company was operating in the segment of passenger cars till the end of 1990s, but since then the brand was repositioned into the segment of heavy off-road trucks and vehicles. Tatra a.s. is owned by a real estate company and Tatra Holding.

Karosa a.s., a bus manufacturer, is another successful example of modernization through foreign direct investment. After the set-back in production following the privatization of the formerly state-owned company in 1991, Karosa entered into cooperation with Renault V.I. which acquired shares of 34% and the European Bank for Reconstruction and Development, which took 17% of shares²⁹. In 1994, the first buses with Renault engines were produced and in 1995 exported. Similar as Skoda, the company was bit-by-bit modernized and – not only in regard to the quality of products and production portfolio, but in all spheres of organization of business.

²⁹ In 1999, Renault and Iveco created a joint company Irisbus Holding which assumed control of 94% of Karosa.

AVIA a.s is a truck manufacturer. In its history aging back to the begin of the last century, AVIA has undergone many changes of both production portfolio and company organization. Already in 1960s, AVIA launched together with Renault two truck models. After the two-thirds of equity were privatized by Czech entities, in order to ensure the further development of the company, the government started looking for appropriate foreign investor. In 1995, a consortium formed by South Korean DAEWOO and Austrian STEYR company won the public tender and acquired 50.2% shares, thus becoming the majority owner. Recently, the company was taken over by India-based Hinduja Group and become part of Ashok Leyland Group.

In the mid of 1990s, KÖGEL AG got majority in the Czech company Orlièan a.s. in Choceò, and following that, a subsidiary KÖGEL a.s. Choceò was founded in 1996.

Although, most of firms that can boast of successful transformation modernized by means of foreign investment, there are several „Czech made“ success stories.

Tovarna Hasici Techniky s.r.o.³⁰ (THT) is one of few companies completely owned and managed by the Czech nationals. The production program of THT includes fire-fighting vehicles, trucks and containers, as well as special purpose vehicles. Operating revenue of THT is growing steadily reaching about 650 CZK million in 2007 from some 270 million in 1998. Number of employees increased from 250 in the 1990s to 375 in 2007.

Another Czech owned company which succeeded to maintain and enlarge the production is Autotech Vinor, s.r.o., producer of attachments on lorries and useful cars. Autotech managed to win world's leading car producers as its customers.

SOR Lybchavi spol. s.r.o. is another successful Czech manufacturer in the automotive sector. The company is very successful in the bus segment, producing both for domestic and for foreign markets (foremost Eastern European Countries). Its operating revenue and sales are growing steadily since the company's privatization in 1991. Less rapid growth of the staff indicates an upward trend in the productivity. The company's buses comply with European Union's environmental standards. Company is owned and managed by the Czech nationals.

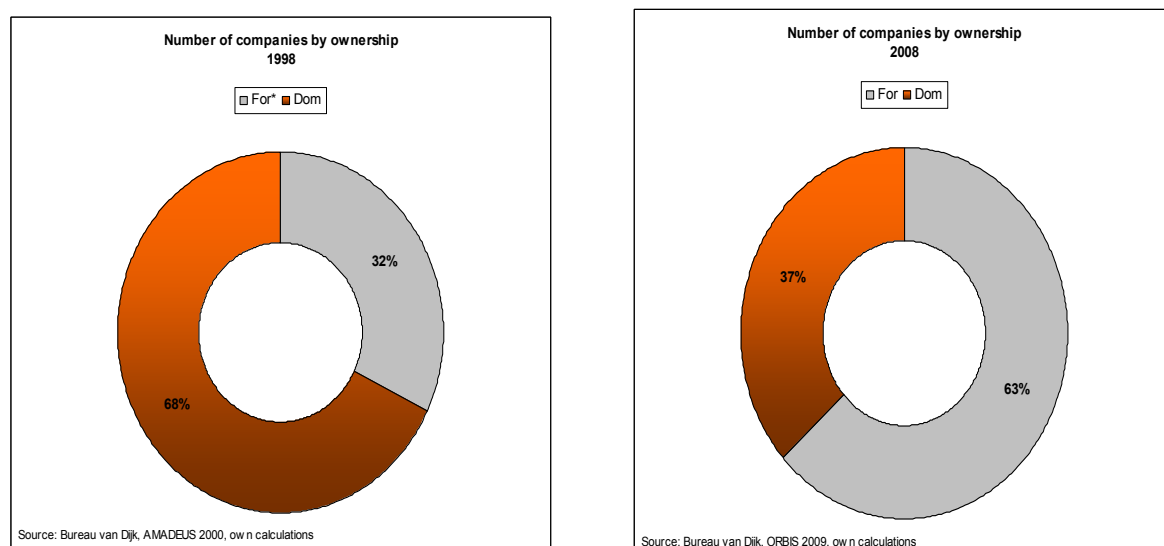
³⁰ s.r.o. stands for „limited company“.

Another Czech manufacturer with long tradition is truck trailers and semi-trailers producer, Panav a.s. Panav's main competitor is Schwarzmüller Tschechien, a 100% subsidiary of Germany-based trailers manufacturer.

Nevertheless, quantitative analyses show the importance of foreign capital in the Czech automotive industry today.

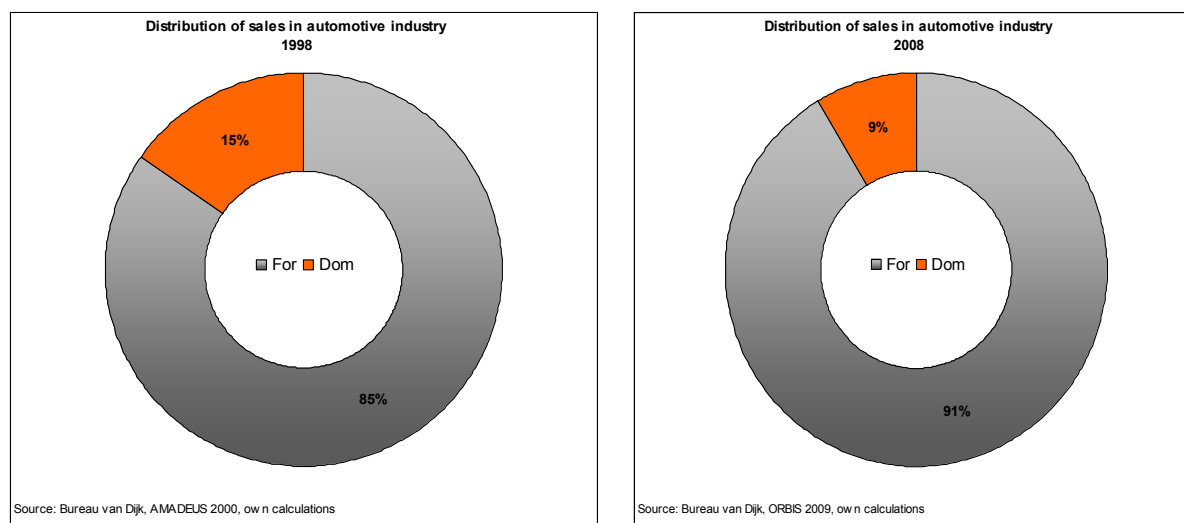
While in 1993, two-third of companies were majority domestic and one-third foreign owned, in 2009 the share of domestically-owned companies shrunk to 37%.

Chart 6.7.I: Change in distribution of firms by ownership



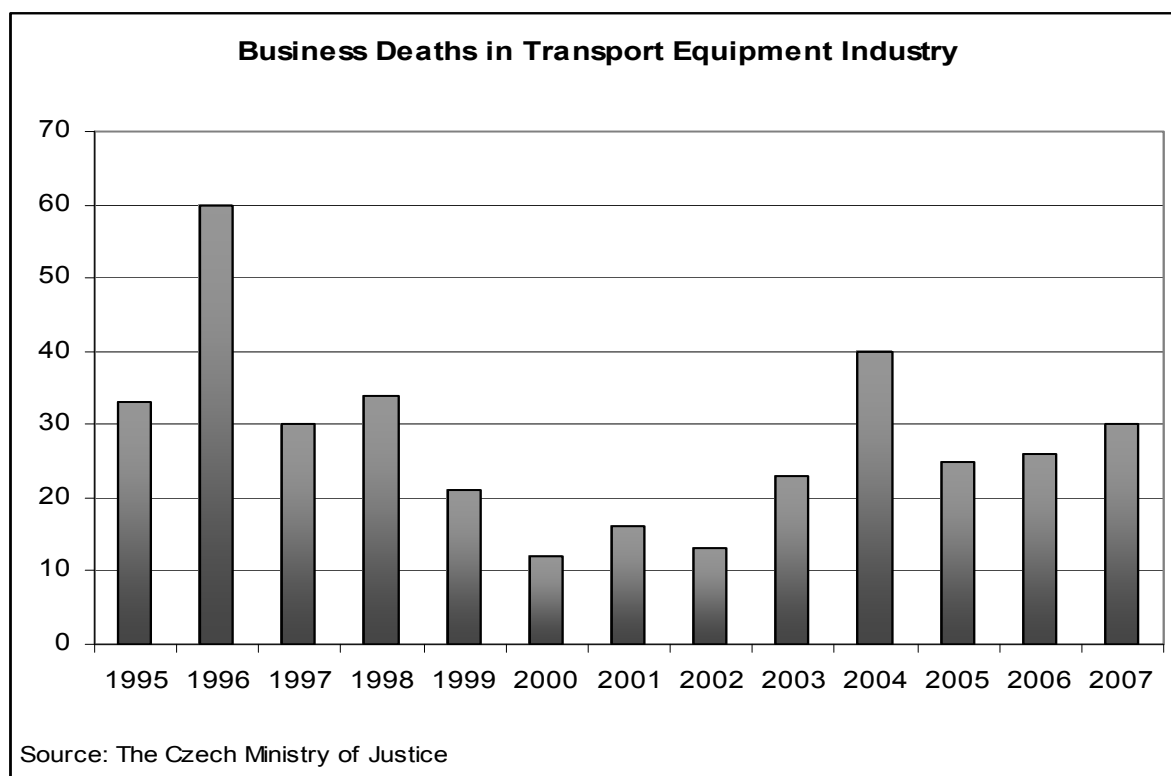
The data on distribution of sales by ownership show however, that a large number of registered domestic companies were only partially active. Already in 1993, only 15% of sales in automotive industry were realized by domestic companies. This share decreased further over the years to 9% in 2009.

Chart 6.7.II: Distribution of sales by ownership



Information on bankruptcies from the Czech Ministry of Justice gives unfortunately no data on the ownership of the firms. Still it illustrates the dynamics of restructuring in the sector over the past two decades.

Chart 6.7.III: Bankruptcies in the Czech transport equipment sector



An in-depth analysis of inactive firms with account in the database ORBIS 2009 shows that the majority of them are domestically owned.

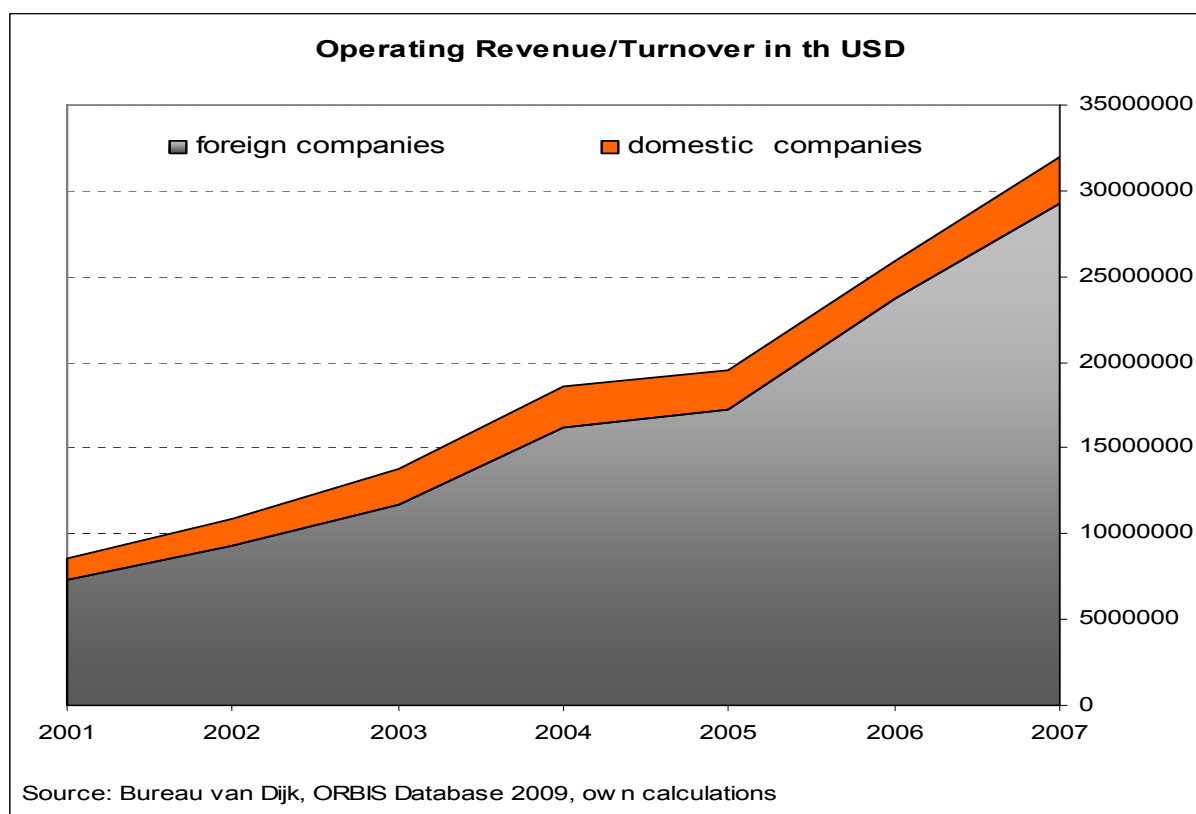
Table 6.7.I: Inactive firms by ownership as listed in ORBIS 2009

Firms	Bankruptcy/Liquidation	Ownership
LIAZ SKODA A.S.	In liquidation	Domestic
JAMOT A.S.	Bankruptcy	Domestic
METACO BO. BR., S.R.O	Bankruptcy	French
PRAGA CASLAV, A.S.	In liquidation	Domestic
BSS METACO, A.S.	In liquidation	French
METIS S.R.O.	In liquidation	Domestic
HTN PISTOL, A.S.	Bankruptcy	Domestic
UNION CR, S.R.O.	In liquidation	German
SAXONIA AUTOMOTIVE, S.R.O.	In liquidation	German
COLLINS & AIKMANN AUTOMOTIVE, S.R.O.	Bankruptcy	German
SVA HOLYSOV, A.S.	In liquidation	Domestic
ISOFLOCK CZ, S.R.O.	Bankruptcy	German
ASPEKTA KOVO, S.R.O.	In liquidation	Domestic

Source: Bureau van Dijk, ORBIS Database 2009

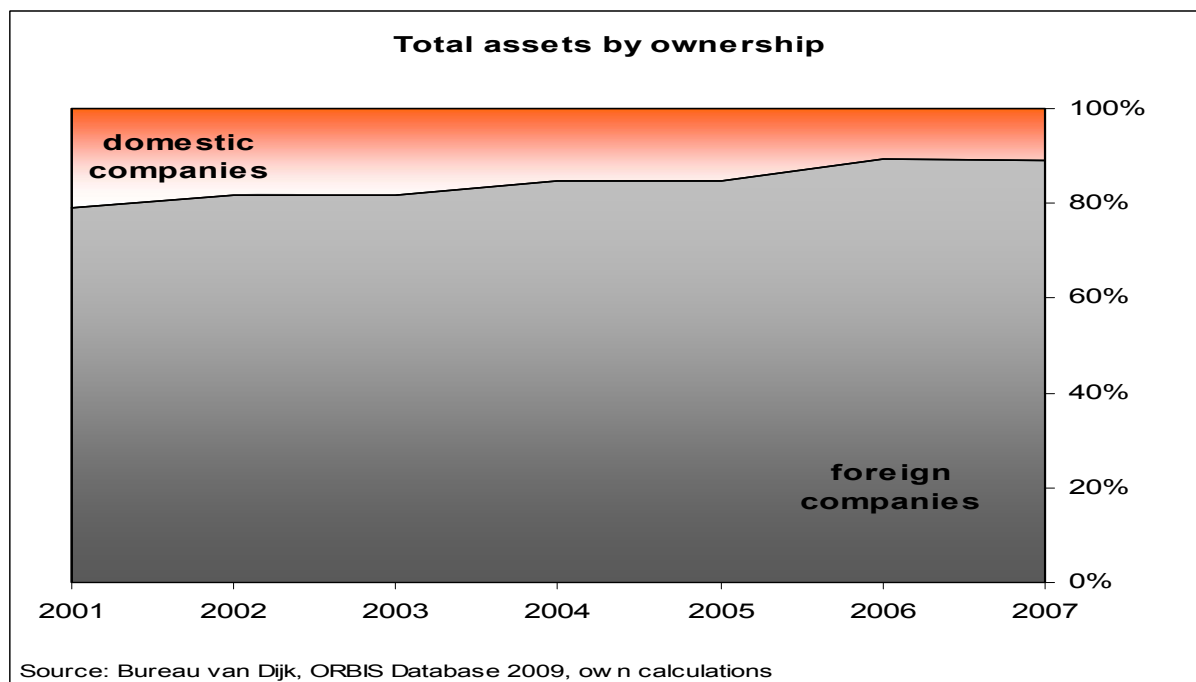
The revenues of firms listed in the database are growing steadily. The role of domestic firms grew slightly from the beginning of 2000s but is minor with some 10% share in reported operating revenues.

Chart 6.7.IV: Revenues of automotive firms listed in ORBIS 2009



At the same time, the data on the total assets show that the total assets in the industry hold by domestic firms has reduced from some 20% in 2001 to approximately 10% in 2007.

Chart 6.7.V: Total assets in the automotive sector for the firms reported in ORBIS 2009



The list of the 25 largest firms measured by turnover in thousands USD illustrate further the dominance of foreign firms in the Czech automotive sector. Only one of the Czech owned firms – Brano Group – achieved into the list.

Table 6.7.II Top 25 companies in automotive sector in the Czech Republic
by turnover in 2007

	Company	Turnover th USD	Employees	Ownership
1	Skoda Auto a.s.	10,803,680*	26695*	German
2	Toyota Peugeot Citroen Automobile Czech, s.r.o. Group	2860674	1750	Japan / France
3	Bosch Diesel, s.r.o.	1299672	7500	German
4	Visteon-Autopal s.r.o.	780155	4500	United States
5	Iveco Czech Republic	676454*	1750*	France
6	Continental Automotive Systems Czech Republic	630800	2250	German
7	Valeo Autoklimatizace, k.s.	570974	1250	France
8	Behr Czech, s.r.o.	544720	750	German
9	Robert Bosch, s.r.o.	543202	1750	German
10	SAS Autosystemtechnik, s.r.o.	542448	375	German / France
11	Continental Teves Czech Republic, s.r.o.	537048	1250	German
12	Automotive Lighting, s.r.o.	505078	1750	German
13	Lucas Varity, s.r.o.	488696	1250	United States
14	Faurecia Exhaust Systems, s.r.o.	448165	750	France
15	Kostal CR, s.r.o.	350960	1750	German
16	Grammer CZ, s.r.o.	327461	1750	German
17	Benteler CZ, s.r.o.	304809	1250	German
18	Delphi Packard Electric Ceska Republika, s.r.o.	294972	3500	United States
19	Futaba Czech, s.r.o.	274997	750	Japan
20	Jtekt Automotive Czech Plzen, s.r.o.	272811	750	Japan
21	Tyco Electronics Czech, s.r.o.	270108	1750	United States /

				Bermuda
22	Dura Automotive CZ, k.s.	269043	1250	German
23	TRW – CARR, s.r.o.	251991	1250	United States
24	Cadence Innovation, k.s.	241758**	1750**	Austria/ Canada
25	Brano Group	227157	n.a.	Czech Republic

Source: Bureau van Dijk, ORBIS Database 2009

* data for 2008

** data for 2003

6.8 Conclusions

The transformation of the Czech automotive industry can certainly be regarded as the success story per se. The total revenue of the industry is growing steadily, and some 90% of the output has been exported. Automotive industry made out 20.2% of total manufacturing output and about 20% of total Czech exports in 2007. The industry employs 120,000 people and is expected to produce 1,200,000 cars annually.

The vital spark for the industry came with the investment of the German Volkswagen Group in the traditional Czech carmaker, Skoda Automobilova. Volkswagen Group acquired initially 30% of the company and took over the management of the joint venture. In the subsequent investments Volkswagen acquired further shares of Skoda Auto to become finally the sole owner in 2001.

Volkswagen established Skoda as fourth brand of the Volkswagen Group. Products and product portfolio has been modernized and enriched. Today, Skoda is established not only in the market of SUV class, but managed to find its way to the class of mid and upper-mid range cars. The changeover in the product line was backed up by simultaneous restructuring and modernization of production facilities as well as by the transfer of technical and managerial know-how. Skoda is producing now about 600,000 vehicles annually, out of which 90% has been exported. This makes about 8% of the total Czech exports.

The entry of Volkswagen triggered a chain of actions by local authorities who made efforts to extend the infrastructure and ensure friendly business environment. The Volkswagen's investment in the carmaker from Mlada Boleslav prompted a tier of car component suppliers

to follow the suit and start operations in the Czech automotive market. According to CzechInvest (2009), the Czech agency for the promotion of foreign direct investment, the Czech Republic hosts hundreds of automotive suppliers today. Fifty per cent of world's top 100 car components suppliers operate plants or hold offices in the Czech Republic.

Success breeds success. The benefits from being part of the Czech Republic's automotive cluster comprise beside in the meantime extensive and robust value chain, well educated and trained human capital and relatively low labor costs and expanded infrastructure also the benefits of the proximity to other European market, foremost Western Europe. Apart from Volkswagen – Skoda, the country hosts meanwhile another two major vehicle producers: Toyota-Peugeot-Citroen Group and Hyundai.

The stake of majority domestic owned companies in the Czech automotive sector is rather modest. Although several Czech owned and managed firms can be regarded as well established in their market segments (e.g. THT, Autotech, SOR Lybchavi), the role of domestic owned firms in the overall automotive sector is minor. The comparison of data from AMADEUS 1998 containing company information from the beginning of the 1990s and recent data provided in ORBIS database, show that already in 1993 a huge number of listed firms operated below capacity. After the period of reconstruction the number of firms and respective output converged to make up some 10% of total output in the automotive sector.

7 Final remarks

After periods of highly critical and hostile attitudes towards transnational corporations, last two decades were characterized by an enormous liberalization of legal and political frameworks for foreign direct investment. Especially among developing countries we witness an increased competition for FDI projects. The transition countries recognized early the potential of foreign direct investment as a catalyst of the transformation process from planned to competitive market economies. Strongest motivation for such an attitude toward FDI is the expectation of access to modern technologies held by transnational companies. Furthermore, a respectable deal of theoretical foundations suggesting that, apart from that direct transfer of technology to foreign affiliates, there are productivity spillovers to local firms that occur as positive externalities from the presence of transnational companies and their operations in host economies. Using an unbalanced panel of more than 8000 firms in five transition countries, the present study looks at the existence, nature and significance of such productivity spillovers in transition economies.

The regression results suggest a positive correlation between firm's productivity and foreign equity participation. Coefficients on foreign capital are positive and significant for all countries. Productivity advantage associated with foreign ownership is much more pronounced in Poland, Romania and Bulgaria, than in Hungary and the Czech Republic. This might indicate a larger technology gap in less developed transition countries.

Similar to a large number of other empirical studies, this study also fails to find strong evidence for positive externalities from foreign direct investment to domestic firms in the same sector. To the extent that foreign and domestic firms compete on national markets, there is a weak evidence to support the hypothesis that technology is transferred locally from foreign to domestic firms. Taking into account the strong regional concentration of foreign companies, the positive correlation between higher productivity of domestic firms and regional foreign presence can be better explained by the fact that foreign companies are attracted to the most dynamic economic regions within transition economies with the highest productivity levels to benefit from agglomeration economies than by the productivity spillovers from foreign to domestic firms. The overall evidence shows, that even if some technology transfer and productivity spillovers occur, net impact of foreign on domestic firms in the same sector seems to be dominated by the negative demand effect.

The results for Hungary give at the first sight a completely different picture. However, a more careful view at the positive net effect of foreign presence on the productivity of domestic firms gives us further insights into the dynamics of the junction between foreign direct investment, competition and productivity spillovers. Since Hungary received the bulk of its inflows of foreign investments already by the beginning of 1990s (years before the other countries caught up in terms of FDI inflows and stocks), we suggest that in this case a long-term effect from FDI and competition might be observed. Given a large productivity gap between foreign and domestic firms in Hungary and missing explicit evidence of productivity spillovers, negative demand effect triggered by the entrance of foreign firms forced least productive Hungarian firms to exit the market, before they managed to develop a knowledge base that would enable them to learn from foreign rivals. This suggests that the long-run effects from the foreign presence in the market are characterized by the immediate and direct market stealing effect on the one side, and slow and conditional learning process on the other.

The presented results show clear benefits from foreign investment for those firms receiving foreign capital but, the effects on domestic firms or appearance of productivity spillovers depend on a whole range of country, industry, region and in particular firm specific factors. Initial productivity levels i.e. technology gap between foreign and domestic firms and correlated learning or knowledge absorptive capacity of local firms determine the domestic firms' reaction on changing competition patterns and learning opportunities following the entrance of foreign firms. Considering investment in R&D as an appropriate measure of absorptive capacity of a firm, we investigated the productivity spillovers in this context.

While the regression results suggest positive effects of investment in R&D on the productivity, the correlation between absorptive capacity as an interaction term between firm's investment in R&D and foreign presence variable is less clear-cut. Contrary to expectations, little evidence has been found of positive impact of absorptive R&D on productivity spillovers from foreign direct investment both in firm and in industries. Especially domestic firms seem to suffer from foreign presence and their R&D investment does not seem to increase their competitiveness enough to countervail against foreign competition. The comparison of R&D investment in local and foreign firms implies that levels of R&D in local firms are so low that they are irrelevant as a measure of firm's learning

ability. Furthermore, former state enterprises in transition countries might hold relative high nominal values of intangible assets, but the bulk of those assets may be considered obsolete.

The in-depth analyses of the Czech automotive sector conform to the above presented results. Positive productivity development and increasing market shares can be observed primarily by foreign owned firms. Overall, this resulted in a unprecedented development of the Czech automotive sector, however, it seems that the Czech economy serves only as location for foreign owned vehicle producers and their suppliers. Notwithstanding the undeniable aggregate positive impact on the economy as a whole, the minor role of the domestic firms in the Czech automotive sector offers space for economic protectionism.

The case analysis makes policy implications more plausible. Main objective of the policy protagonist should be strengthening of location-specific segments such as infrastructure, adequate qualification of the labor force and providing business-friendly atmosphere. In order to maximize the benefits from the foreign direct investment and to endorse the productivity spillovers, the policy should consider the systematic investments aimed at the supporting domestic firms in reaching the technology frontier.

List of references

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

Aitken, B. and A. Harrison and R. E. Lipsey (1996): Wages and Foreign Ownership – A Comparative Study of Mexico, Venezuela and the United States. *Journal of International Economics*, Vol. 40, pp. 345-371.

Aitken, B. and A. Harrison (1994): Do Domestic Firms Benefit from Foreign Direct Investment? Evidence from Panel Data. Policy Research Working Paper 1248. The World Bank.

Alibert, R.Z. (1971): The Multinational Enterprise in Multiple Currency World. In: Dunning, J.H. (ed.): *The Multinational Enterprise*. George Allen & Unwin. London.

Altomonte, C. and E. Pennings (2005): Testing for Marginal Spillovers from Foreign Direct Investment. Tinbergen Institute Discussion Paper 2005-101/4.

Audretsch, D.B. (1998): Agglomeration and the location of innovative activity. *Oxford Review of Economic Policy*, Vol. 14, pp. 18-29.

Avgeris, J. (1994): *Die Absorptionsbedingungen eines erfolgreichen Technologietransfers. Zu den Chancen in den Entwicklungsländern*. Dissertation an der Universität Bielefeld.

Balasubramanyam, U.N. (1973): *International Transfer of Technology to India*. Praeger. New York.

Barrel, R. and D. Holland (2000): Foreign direct investment and enterprise restructuring in Central Europe. *Economics of Transition*, Vol. 8 (2), pp. 477-504.

Barrios, S. and E. Strobl (2002): FDI spillovers in Spain. *Weltwirtschaftliches Archiv*, Vol. 138, pp. 459-481.

Bedi, A.S. and A. Cieslik (2002): Wages and wage growth in Poland. *Economics of Transition*, Vol. 10 (1), pp. 1-27.

Behrmann, J. N. and H. W. Wallender (1976): *Transfers of Manufacturing Technology within Multinational Enterprises*. Ballinger. Cambridge.

Berger, F. (1981): *Der Begriff der Absorptionsfähigkeit. Theoretische Aspekte und praktische Relevanz. Eine Untersuchung am Beispiel Venezuela*. Rita G. Fischer Verlag. Frankfurt/Main.

Blomström, M. (1986): Foreign Investment and Productive Efficiency: The Case of Mexico. *Journal of Industrial Economics*, Vol. 35, pp. 97-112.

Blomström, M. (1991): Host Country Benefits of Foreign Investment. In: McFetridge, D. G. (ed.): *Foreign Investment, Technology and Economic Growth*, pp. 93-108. Toronto University Press. Toronto, London.

Blomström, M. and A. Kokko (1993): Policies to encourage inflows of technology through foreign multinationals. NBER discussion paper 4289. Cambridge.

Blomström, M. and A. Kokko (1996): Multinational Corporations and Spillovers. CEPR Discussion Paper Nr. 1365. Centre for Economic Policy Research. London.

Blomström, M. and E. N. Wolff (1994): Multinational Corporations and Productivity Convergence in Mexico. In: Baumol, Nelson and Wolff (eds.): *Convergence of Productivity*, Oxford University Press.

Blomström, M. and F. Sjöholm (1998): Technology, Transfer and Spillovers: Does Local Participation with Multinationals Matter? CEPR Discussion Paper No. 2048. Centre for Economic Policy Research.

Blomström, M. and H. Persson (1983): Foreign Investment and Spillover Efficiency in an Underdeveloped Economy: Evidence from the Mexican Manufacturing Industry. *World Development*, Vol. 11, pp. 493-501.

Blomström, M. and S. Globerman and A. Kokko (1999): The Determinants of Host Country Spillovers from Foreign Direct Investment: Review and Synthesis of the Literature. Discussion paper 339. Stockholm School of Economics.

Blomström, M. and A. Kokko and M. Zejan (2000): *Foreign Direct Investment: Firm and Host Country Strategies*. Macmillan Press. London.

Bobeva, D. (1997): Policy Implications of FDI. In: *Migration, Free Trade and Regional Integration in Central and Eastern Europe*. Staatssekretariat für Europäische Angelegenheiten. Schriftenreihe des Bundeskanzleramtes, pp. 175-178. Verlag Österreich. Wien.

Bosco, M. G. (2001): Does FDI Contribute to Technological Spillovers and Growth? A Panel Data Analyses of Hungarian Firms. *Transnational Corporations*, Vol. 10, pp. 43-68.

Brash, D.T. (1966): *American Investment in Australian Industry*. Harvard University Press. Cambridge, Mass.

Braun, M. (1995): *Determinanten der Kapitalabsorptionsfähigkeit von Entwicklungsländern unter besonderer Berücksichtigung ausländischer Direktinvestitionen*. Peter Lang Verlag. Frankfurt/Main.

Broll, U. and B.M. Gilroy (1994): *Außenwirtschaftstheorie – Einführung und Neuere Ansätze*. Munich, Vienna.

Bruhn, M. and C. Homburg (1999): Kundenbindungsmanagement – Eine Einführung in die theoretischen und praktischen Problemstellungen. In: Bruhn M. and C. Homburg (eds.): *Handbuch Kundenbindungsmanagement. Grundlagen – Konzepte – Erfahrungen*, pp. 4-35. Gabler Verlag. Wiesbaden.

Buckley, P.J. and M. Casson (1976): *The Future of the Multinational Enterprise*. Macmillan. London and Basingstoke.

Buckley, P. L. and M. Casson (1985): *The Economic Theory of the Multinational Enterprise*. Macmillan. London.

Bureau van Dijk (2000): AMADEUS. Electronic financial database. Bureau van Dijk. Amsterdam.

Bureau van Dijk (2009): ORBIS. Electronic financial database. Bureau van Dijk. Amsterdam.

Burger, B. (1998): *Ausländische Direktinvestitionen, technologische Spillover-Effekte und industrielle Entwicklung dargestellt am Beispiel Mexiko*. Nomos Verlag. Baden-Baden.

Campos, N.F. and Y. Kinoshita (2002): Foreign Direct Investment as Technology Transferred: Some Panel Evidence from the Transition Economies. *The Manchester School*, Vol. 70 (3), pp. 398-419.

Cantwell, J. (1989): *Technological Innovation and Multinational Corporations*. Basil Blackwell. Oxford.

Cantwell, J. (1995): The Globalisation of Technology. What Remains of the Product Cycle Model? *Cambridge Journal of Economics*, Vol. 19, pp. 155-174.

Cantwell, J. A. and R. Narula (2001): The Eclectic Paradigm in the Global Economy. *International Journal of the Economics of Business*, Vol. 8, pp. 155-172.

Castellani, D. and A. Zanzi (2003): Technology gaps, absorptive capacity and the impact of inward investments on productivity of European firms. *Econ. Innov. New Techn.*, Vol. 12 (6), pp. 555-576.

Caves, R.E. (1971): International Corporations: The Industrial Economics of Foreign Investment. *Economica*, Vol. 38, pp. 1-27.

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

Caves, R.E. (1996): *Multinational Enterprises and Economic Analyses*. Cambridge University Press.

Chen, E.K.Y. (1983): *Multinational Corporations, Technology and Employment*. Macmillan. London.

Coase, R. H. (1937): The Nature of the Firm. *Economica*, Vol. 16, pp. 386-405.

Cohen, W. and D. Levinthal (1989): Innovation and learning: the two faces of R&D. *Economic Journal*, Vol. 99, pp. 569-96.

Cohen, W. M. and D. A. Levinthal (1990): Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, Vol. 35, pp. 128-152.

Corden, W.M. (1967): Protection and Foreign Investment. *Economic Record*, Vol. 43, pp. 209-232.

Csáki, G. (1998): Foreign Direct Investment in Hungary. *Economic Trends and Research Summaries*, Vol. 1, pp. 13-31. GKI – Economic Research Co. Budapest.

CzechInvest (2009): CzechInvest. Investment and Business Development Agency. <http://www.czechinvest.org>.

Damijan, J. P. and B. Majcen and M. Knell and M. Rojec (2003a): The Role of FDI, R&D Accumulation and Trade in Transferring Technology to Transition Countries: Evidence from Firm Panel Data for Eight Transition Countries. *Economic Systems*, Vol. 27, pp. 189-204.

Damijan, J. P. and B. Majcen and M. Knell and M. Rojec (2003b): Technology Transfer through FDI in Top-10 Transition Countries: How Important Are Direct Effects, Horizontal and Vertical Spillovers? William Davidson Working Paper 549.

Damijan, J.P. and M. Knell (2005): How Important Is Trade and Foreign Ownership in Closing the Technology Gap. Evidence from Estonia and Slovenia. *Review of World Economics* , 141 (2), pp. 271-95.

Das, S. (1987): Externalities and technology transfer through multinational corporations. *Journal of International Economics*, Vol. 90, pp. 1142 – 1165.

Deane, R.S. (1970): *Foreign Investment in New Zealand Manufacturing*. Allen & Unwin. London.

Dittrich, S. (2000): *Kundenbindung als Kernaufgabe im Marketing*. Dissertation an der Universität St. Gallen, Hochschule für Wirtschafts-, Rechts- und Sozialwissenschaften.

Djankov, S. and B. Hoekman (2000): Foreign Investment and Productivity Growth in Czech Enterprises. *World Bank Economic Review*, Vol. 14 (1), pp. 49-64.

Dosi, G. and K. Pavitt and L. Soete (1990): *The economics of technical change and international trade*. New York University Press.

Driffield, N. (2001): The impact on domestic productivity of inward investment in the UK. *The Manchester School*, Vol. 69 (1), pp. 103-119.

Driffield, N. and J. Love (2001): *Does the Motivation for Foreign Direct Investment Affect Productivity Spillovers to the Domestic Sector?* University of Birmingham.

Dunning, J. H. (1972): The location of international firms in an enlarged EEC: An exploratory paper. *Journal of international business studies*. Palgrave Macmillan.

Dunning, J. H. (1981): Trade, Location of Economic Activity and the Multinational Enterprise: A Search for an Eclectic Approach. In: Dunning (ed.): *The Theory of Transnational Corporations*.

Dunning, J.H. (1958): *American Investment in British Manufacturing*. Allen & Unwin. London.

Dunning, J.H. (1980): Towards an Eclectic Theory of International Production: Some Empirical Tests. *Journal of International Business Studies*, Vol. 11, pp. 9-31.

Dunning, J.H. (1988): *Explaining International Production*. Unwin Hyman. London.

Dunning, J.H. (1993): *Multinational Enterprises and the Global Economy*. Addison-Wesley. Wokingham.

Dunning, J. H. (2003): *Economic Analysis and the Multinational Enterprise*. Routledge.

Enderwick, P. (1996): Transnational Corporations and Human Resources. In: *Transnational Corporations and World Development*, pp. 215-249. UNCTAD. International Thomson Business Press. New York.

Estrin, S. and K. Hughes and S. Todd (1997): *Foreign Direct Investment in Central and Eastern Europe. Multinationals in Transition*. The Royal Institute of International Affairs. London, Washington.

Ernst and Young (2009): European attractiveness survey. Ernst & Young Advisory.

Eurostat (2008): NACE Rev. 2 – Statistische Systematik der Wirtschaftszweige in der Europäischen Gemeinschaft. Eurostat Methodologies and Working papers, pp. 343. Eurostat. Luxembourg.

Evans, P. (1977): Direct Investment and Industrial Concentration. *Journal of Development Studies*, Vol. 13, pp. 373-385.

Evenett, S. and A. Voicu (2001): *Picking Winners or Creating Them? Revisiting the Benefits of FDI in the Czech Republic*. University of St. Gallen.

Fairchild, L. and K. Sosin (1986): Evaluating Differences in Technological Activity between Transnational and Domestic Firms in Latin America. *Journal of Development Studies*, Vol. 22, pp. 697-708.

Findlay, R. (1978): Relative backwardness, direct foreign investment and the transfer of technology: A simple dynamic model. *Quarterly Journal of Economics*, Vol. 92, pp. 1-16.

Forschungsinstitut für Berufs- und Fachschulwesen (1990): Neue Technologien und Anforderungen an die Qualifikation in der Entwicklung der Berufsbildung der Tchechoslowakei (CEDEFOP – Dokument). Berlin.

Forsyth, D. (1972): *U.S. Investment in Scotland*. Praeger. New York.

Fosfuri, A. and M. Motta (1999): Multinationals without advantages. *Scandinavian Journal of Economics*, Vol. 101, pp. 617-630.

Fosfuri, A. and M. Motta and T. Ronde (2001): Foreign Direct Investment and Spillovers through Worker's Mobility. *Journal of International Economics*, Vol. 53 (1), pp. 205-222.

Gerschenberg, I. (1987): The Training and Spread of Managerial Know-How. A Comparative Analysis of Multinational and Other Firms in Kenya. *World Development*, Vol. 15, pp. 931-939.

Gerschenkron, A. (1962): *Economic Backwardness in Historical Perspective*. Harvard University Press. Cambridge, Mass.

Girma S. and D. Greenaway and K. Wakelin (2001): Who benefits from foreign direct investment in the UK? *Scottish Journal of Political Economy*, Vol. 48, pp. 119-133.

Girma, S. (2003): Absorptive capacity and productivity spillovers from FDI: a threshold regression analysis. EEG Working paper 25/2003.

Girma, S. and H. Görg (2002): Foreign direct investment, spillovers and absorptive capacity: Evidence from quantile regressions. GEP Research Paper 2002/14. University of Nottingham.

Girma, S. and K. Wakelin (2001): Regional Underdevelopment: Is FDI the solution: A semiparametric analysis. GEP Working paper 2001/14. University of Nottingham.

Glass, A. and K. Saggi (1998): International technology transfer and the technology gap. *Journal of Development Economics*, Vol. 55, pp. 369-398.

Globerman, S. (1979): Foreign Direct Investment and “Spillover” Efficiency Benefits in Canadian Manufacturing Industries. *Canadian Journal of Economics*, Vol. 12, pp. 43 – 56.

Gomulka, S. (1990): *The Theory of Technological Change and Economic Growth*. Routledge. London and New York.

Gorodnichenko, Y. and J. Svejnar and K. Terrell (2007): *Horizontal and Vertical Spillovers in Transition Economies: Do Institutions Matter?*. University of Michigan, mimeo.

Gottinger, H. W. (1987): Economic Choice and Technology Diffusion in New Product Markets. *Weltwirtschaftliches Archiv*, Vol. 123, pp. 485 – 488.

Görg, H. und E. Strobl (2001): Multinational Companies and Productivity Spillovers: A Meta-Analysis. *Economic Journal*, Vol. 111, pp. 723-739.

Griffith, R. and S. Redding and H. Simpson (2002): Productivity convergence and foreign ownership at establishment level. IFS Working paper WP02/22. Institute for Fiscal Studies.

Griffith, R. and H. Simpson (2002): Characteristics of foreign-owned firms in British manufacturing. In R. Blundell and D. Card and R. Freeman (eds.): *Creating a Premier League Economy*. Chicago University Press. Chicago.

Griffith, R. and S. Redding and J. Van Reenen (2000): Mapping the two faces of R&D: productivity growth in a panel of OECD industries. IFS Working Paper WP02/00. Institute for Fiscal Studies. London.

Grossman, G. M. and E. Helpman (1997): *Innovation and Growth in the Global Economy*. MIT Press. Cambridge.

Gutmann, B. (1996): Zur Gestaltung des Know-how-Transfers. In: Groenewald, H. and B. Leblanc (Hrsg.): *Personalarbeit auf Marktwirtschaftskurs. Transformationsprozesse im Joint Venture Skoda – Volkswagen*. Luchterhand.

Günther, J. (2003): *Das Zustandekommen von Technologie-Spillovers durch ausländische Direktinvestitionen: Eine empirische Untersuchung am Beispiel der ungarischen Industrie*. Nomos-Verlagsgesellschaft. Baden-Baden.

Haddad, M. and A. Harrison (1992): Are There Positive Spillovers from Direct Foreign Investment? Evidence From Panel Data for Morocco. *Journal of Development Economics*, Vol. 42, pp. 51 – 74.

Hansen, B.E. (2000): Sample splitting and threshold estimation. *Econometrica*, Vol. 68, pp. 575-603.

Haskel, J.E. and S.C. Pereira and M.J. Slaughter (2002): Does inward foreign direct investment boost the productivity of domestic firms? NBER Working Paper 8724.

Hirsch, S. (1980): An international trade and investment theory of the firm. The Determinants of Foreign Investments: Relevant Aspects for Assessing the Role of Investment Incentive. OECD. Paris.

Hill, H. (1982): Vertical Inter-Firm Linkages in LDCs: A Note on the Philippines. *Oxford Bulletin of Economics and Statistics*, Vol. 44, pp. 261-271.

Hopfenbeck, W. (1996): *Allgemeine Betriebswirtschaft- und Managementlehre*. Verlag Moderne Industrie. Landsberg/Lech.

Hymer, S. (1960): *The International Operations of National Firms: A Study of Direct Investment*. Ph.D. Thesis. MIT. Cambridge.

Hymer, S.H. (1976): *The International Operations of National Firms: A Study of Direct Foreign Investment*. MIT Press. Boston.

ILO (1984): Technology Choice and Employment Generation by Multinational Enterprises in Developing Countries. International Labor Organization. Geneva.

Imbriani, C. and F. Reganati (1999): Productivity Spillovers and Regional Differences: Some Evidence on the Italian Manufacturing Sector. Discussion paper No. 48. Centro di Economic del Lavoro e di Politica Economica. Università di Salerno. Giugno.

Inzelt, A. (1998): The Transformation Role of FDI in R&D: Analyses based on Material of a Databank. In: Dyker, D. and S. Radošević (eds.): *Innovation and Structural Change in Post-Socialist Countries. A Quantitative Approach*, pp. 185-201. Kluwer Academic Publishers. Dordrecht, Boston, London.

Jenkins, R. (1987): *Transnational Corporations and Uneven Development: The Internalization of Capital and the Third World*. Methuen. London and New York.

Jenkins, R. (1990): Comparing Foreign Subsidiaries and Local Firms in LDCs: Theoretical Issues and Empirical Evidence. *Journal of Development Studies*, Vol. 26, pp. 205-228.

Javorcik Smarzyska, B. (2004): Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers Through Backward Linkages. *American Economic Review*, Vol. 94 (3), pp. 605-27.

Javorcik Smarzyska, B. and M. Spatareanu (2003): To Share or Not To Share? Does Local Participation Matter for Spillovers From Foreign Direct Investment? Policy Research Working Paper Series 3118. The World Bank.

Katz, J.M. (1969): *Production Functions, Foreign Investment and Growth*. North Holland. Amsterdam.

Katz, J.M. (1987): *Technology Creation in Latin American Manufacturing Industries*. St. Martin's Press. New York.

Kinoshita, Y. (2000): R&D and technology spillovers through FDI: innovation and absorptive capacity. William Davidson Institute Working Paper Number 349. University of Michigan Business School.

Kinoshita, Y. (2001): R&D and Technology Spillovers through FDI: Innovation and Absorptive Capacity. CEPR Discussion paper 2775.

Kinoshita, Y. and N.F. Campos (2003): Why Does FDI Goes Where IT Goes? New Evidence from the Transition Economies. William Davidson Institute Working Paper 573.

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

Koizumi, T. and K.J. Kopecky (1977): Economic Growth, Capital Movements and the International Transfer of Technical Knowledge. *Journal of International Economics*, Vol. 7, pp. 45-65.

Kokko, A. (1992): *Foreign Direct Investment, Host Country Characteristics, and Spillovers*. Stockholm School of Economics.

Kokko, A. (1994): Technology, Market Characteristics and Spillovers. *Journal of Development Economics*, Vol. 43 (2), pp. 279-93.

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

Kolasa, M. (2007): How does FDI inflow affect productivity of domestic firms? The role of horizontal and vertical spillovers, absorptive capacity and competition. National Bank of Poland Working Paper 42.

Konings, J. (2001): The Effect of Direct Foreign Investment on Domestic Firms: Evidence from Firm Level Panel Data in Emerging Economies. *Economics of Transition*, Vol. 9 (3), pp. 619-33.

Kosova, R. (2005): *Do Foreign Firms Crowd-Out Domestic Firms? Evidence from the Czech Republic*. Ph.D. Thesis. University of Michigan. Business School.

Lake, A.W. (1979): Technology Creation and Technology Transfer by Multinational Firms. In: R.G. Hawkins (ed.): *Research in International Business and Finance, Vol. 1: The Economic Effects of Multinational Corporations*. JAI Press. Greenwich.

Lall, S. (1978): Transnationals, Domestic Enterprises and Industrial Structure in LDCs: A Survey. *Oxford Economic Papers*, Vol. 30, pp. 217-248.

Lall, S. (1979): Multinationals and Market Structure in an Open Developing Economy: The Case of Malaysia. *Weltwirtschaftliches Archiv*, Vol. 115, pp. 325-350.

Lall, S. (1980): Vertical Inter-Firm Linkages in LDCs: An Empirical Study. *Oxford Bulletin of Economics and Statistics*, Vol. 42, pp. 203-226.

Lall, S. (1990): *Building Industrial Competitiveness in Developing Countries*. OECD. Paris.

Lall, S. (1992): Technological Capabilities and Industrialization. *World Development*, Vol. 20 (2), pp. 165-186.

Lall, S. and P. Streeten (1977): *Foreign Investment, Transnationals and Developing Countries*. London. Macmillan.

Lapan, H. and P. Bardhan (1973): Localised technical progress and the transfer of technology and economic development. *Journal of Economic Theory*, Vol. 6, pp. 585-95.

Lebenstein, H. (1966): Allocative Efficiency vs. X-Efficiency. *American Economic Review*, Vol. 56, pp. 392-415.

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

Lim, L.Y.C. and E.F. Pang (1982): Vertical Linkages and Multinational Enterprises in Developing Countries. *World Development*, Vol. 10, pp. 585-595.

Lipsey, R. E. (2007): Measuring the Impacts of FDI in Central and Eastern Europe. In: Liebscher et al. (eds.): *Foreign Direct Investment in Europe*. Edward Elgar Publishing.

Lorentzen, J. (1998): Foreign Capital, Central Europe's Catch-up, and EU Enlargement. *Journal of International Relations and Development*, Vol. 1-2, pp. 8-19.

Lucas, R. E., Jr. (1988): On the Mechanisms of Economic Development. *Journal of Monetary Economics*, Vol. 22 (1), pp. 3-42.

MacDougall, G.D.A. (1960): The Benefits and Costs of Private Investments from Abroad: A Theoretical Approach. *Economic Record*, Vol. 36, pp. 13 – 35.

Mansfield, E. (1994): Intellectual Property Protection, Foreign Direct Investment, and Technology Transfer. IFC Discussion paper 19. International Financial Corporation. Washington.

Mansfield, E. and A. Romeo (1980): Technology Transfer to Overseas Subsidiaries by U.S. – Based Firms. *The Quarterly Journal of Economics*, Vol. 95, pp. 737-750.

Mansfield, E., and A. Romeo and S. Wagner (1979): Foreign Trade and US Research and Development. *Review of Economics and Statistics*, Vol. 61, pp. 49-57.

Markusen, J. R. and J. R. Melvin (1988): *The theory of international trade*. New York, Cambridge.

McAleese, D. and D. McDonald (1978): Employment Growth and Development of Linkages in Foreign-Owned and Domestic Manufacturing Enterprises. *Oxford Bulletin for Economics and Statistics*, Vol. 40, pp. 321-339.

McMillan, C. H. (1996): Foreign Direct Investment in Eastern Europe: Harnessing FDI to the Transition from Plan to Market. In: Chan, S. (ed.): *Foreign Direct Investment in a Changing Global Political Economy*, pp. 127-149. St. Martins. New York.

Meyer, K.E. and E. Sinani (2008): When and where does foreign direct investment generate positive spillovers? A meta-analysis. *Journal of International Business Studies*. forthcoming

Mohnen, P. (1996): R&D Externalities and Productivity Growth. *STI-Review: Science, Technology, Industry*, Vol. 18, pp. 39-66.

Murrell, P. (1996): How Far has the Transition Progressed? *Journal of Economic Perspectives* Vol. 10 (2), pp. 25-44.

Nagy, K. (1997): FDI and employment creation. In: *Migration, Free Trade and Regional Integration in Central and Eastern Europe*. Staatssekretariat für Europäische Angelegenheiten. Schriftenreihe des Bundeskanzleramtes, pp. 179-180. Verlag Österreich. Wien.

Neven, D. and G. Siotis (1996): Technology sourcing and FDI in EC: An empirical evaluation. *International Journal of Industrial Organization*, Vol. 14, pp. 543-560.

Nováček, P. and M. Smutný (1996): Skoda-Perspektiven unter markt-wirtschaftlichen Vorzeichen. In: Groenewald, H. and B. Leblanc (eds.): *Personalarbeit auf Marktwirtschaftskurs. Transformationsprozesse im Joint Venture Skoda – Volkswagen*. Luchterhand.

Pack, H. and L. E. Westphal (1986): Industrial Strategy and Technological Change: Theory versus Reality. *Journal of Development Economics*, Vol. 22, pp. 87-121.

Page, J.M. (1980): Technical Efficiency and Economic Performance: Some Evidence from Ghana. *Oxford Economic Papers*, Vol. 32, pp. 319-339.

Pohanka, E. and A. Neubeiser (1996): Reorganisation des Betrieblichen Vorschlagswesen. In: Groenewald, H. and B. Leblanc (eds.) *Personalarbeit auf Marktwirtschaftskurs. Transformationsprozesse im Joint Venture Skoda – Volkswagen*. Luchterhand.

Quaisser, W. (1995): Ausländische Direktinvestitionen im polnischen Transformationsprozeß. Discussion paper 184. Osteuropa-Institut. Munich.

Radosevic, S. and D. Dyker (1997): Technological Integration and Global Marginalization of Central and East European Economies: the Role of FDI and Alliances. In: Sharma, S. (ed.): *Restructuring Eastern Europe. The Microeconomics of the Transition Process*, pp. 111-127. Edward Elgar. Cheltenham.

Reinhard, M. (2001): Absorptionskapazität und Nutzung externen technologischen Wissens in Unternehmen. *ifo Schnelldienst*, Vol. 54 (4), pp. 28-39.

Reuber, G. L. and H. Crookell and M. Emerson and G. Gallais-Hamonno (1973): *Private Foreign Investment in Development*. Clarendon Press. Oxford.

Riedel, J. (1975): The Nature and Determinants of Export-Oriented Direct Foreign Investment in a Developing Country: A Case Study of Taiwan. *Weltwirtschaftliches Archiv*, Vol. 111, pp. 505-528.

Robock, S. H. (1980): *The International Technology Transfer Process*. National Academy of Sciences. Washington D.C.

Romer, P. (1986): Increasing Returns and Long-run Growth. *Journal of Political Economy*, Vol. 94 (5), pp. 1002-1037.

Romer, P. (1990): Endogenous Technological Change. *Journal of Political Economy*, Vol. 98, pp. 71-102.

Rosenberg, N. (1976): *Perspectives on Technology*. Cambridge University Press. New York.

Rosenbluth, G. (1970): The Relation between Foreign Control and Concentration in Canadian Industry. *Canadian Journal of Economics*, Vol. 3, pp. 14-38.

Rugman, A. M. (1980): Internalization as a General Theory of Foreign Direct Investment: A Re-Appraisal of the Literature. *Weltwirtschaftliches Archiv*, Vol. 116, pp. 365-379.

Schoors K. and B. van der Tol (2002): Foreign Direct Investment Spillovers within and between Sectors: Evidence from Hungarian Data. Ghent University Working Paper 2002/157.

Schwed, A. (1998): The Protection of Intellectual Property Rights in the Scope of the TRIPS-Agreement of the WTO. In: Altvater, E. and K. Prunskiene (eds.): *Intellectual Property Rights in Central and Eastern Europe. The Creation of Favourable Legal and Market Preconditions*, pp. 28-32. IOS-Press. Amsterdam, Berlin.

Sinani, E. and K. Meyer (2004): Spillovers of Technology Transfer From FDI: The Case of Estonia. *Journal of Comparative Economics*, Vol. 32 (3), pp. 445-66.

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

Sjöholm, F. (1999b): Productivity Growth in Indonesia: The Role of Regional Characteristics and Direct Foreign Investment. *American Journal of Sociology, Economic Development and Cultural Change*. The University of Chicago.

Skoda Auto (2000): *Annual Report*. Skoda Auto. Mlada Boleslav

Skoda Auto (2001): *Annual Report*. Skoda Auto. Mlada Boleslav

Skoda Auto (2002): *Annual Report*. Skoda Auto. Mlada Boleslav

Skoda Auto (2003): *Annual Report*. Skoda Auto. Mlada Boleslav

Skoda Auto (2004): *Annual Report*. Skoda Auto. Mlada Boleslav

Skoda Auto (2005): *Annual Report*. Skoda Auto. Mlada Boleslav

Skoda Auto (2006): *Annual Report*. Skoda Auto. Mlada Boleslav

Skoda Auto (2007): *Annual Report*. Skoda Auto. Mlada Boleslav

Skoda Auto (2008): *Annual Report*. Skoda Auto. Mlada Boleslav

Smarzynska, B. (1999): Composition of Foreign Direct Investment and Protection of Intellectual Property Rights in Transition Countries. CEPR Discussion paper 2228. Centre for Economic Policy Research. London.

Smid, S. (1998): Intellectual Property Law Uniformity in the CEECs and the EU: Conformity Issues and an Overview. In: Altvater, E. and K. Prunskiene (eds.): *Intellectual Property Rights in Central and Eastern Europe. The Creation of Favourable Legal and Market Preconditions*, pp. 28-32. IOS-Press. Amsterdam, Berlin.

Swan, P.L. (1973): The International Diffusion of an Innovation. *Journal of Industrial Economics*, Vol. 22, pp. 61-69.

Sydow, J. (1992): *Strategische Netzwerke: Evolution und Organisation*. Gabler Verlag. Wiesbaden.

Teece, D.J. (1977): Technology Transfer by Multinational Firms: The Resource Cost of Transferring Technological Know-how. *Economic Journal*, Vol. 87 (346), pp. 242-61.

Tilton, J.E. (1971). *The International Diffusion of Technology: The Case of Semiconductors*. Brookings Institution. Washington.

UNCTAD (1997): *World Investment Report 1997 – Transnational Corporations, Market Structure and Competition Policy*. United Nations Conference on Trade and Development. United Nations. New York and Geneva.

UNCTAD (1999): *World Investment Report 1999 – Foreign Direct Investment and the Challenge of Development*. United Nations Conference on Trade and Development. United Nations. New York and Geneva.

UNCTAD (2003): *World Investment Report 2003 – FDI Policies for Development: National and International Perspectives*. United Nations Conference on Trade and Development. United Nations. New York and Geneva.

UNCTAD (2003a): *Investment and technology policies for competitiveness: Review of successful country experiences*. United Nations. New York and Geneva.

UNCTAD (2005): *World Investment Report 2005 – Transnational Corporations and the Internationalization of R&D*. United Nations Conference on Trade and Development. United Nations. New York and Geneva.

UNCTAD (2006): *World Investment Report 2006 – FDI from Developing and Transition Economies: Implications for Development*. United Nations Conference on Trade and Development. United Nations. New York and Geneva.

UNCTAD (2007): *World Investment Report 2007 – Transnational Corporations, Extractive Industries and Development*. United Nations Conference on Trade and Development. United Nations. New York and Geneva.

UNCTAD (2008): *World Investment Report 2008 – Transnational Corporations and the Infrastructure Challenge*. United Nations Conference on Trade and Development. United Nations. New York and Geneva.

UNCTC (1981): *Transnational Corporation Linkages in Developing Countries: The Case of Backward Linkages via Subcontracting*. United Nations. New York.

Vahter, P. (2005): Which Firms Benefit More from Inward Foreign Direct Investments? Bank of Estonia Working Paper No. 2005-11.

Veblen, T. (1915): *Imperial Germany and the Industrial Revolution*. Macmillan. London.

Vernon, R. (1966): International Investment and International Trade in the Product Cycle. *Quarterly Journal of Economics*, Vol. 80, pp. 190-207.

Wang, Y. and M. Blomström (1992): Foreign Investment and Technology Transfer: A Simple Model. *European Economic Review*, Vol. 36, pp. 137-155.

Watanabe, S. (1983): Technological Linkages through Subcontracting in Mexican Industries. In: S. Watanabe (ed.): *Technology Marketing and Industrialization: Linkages between Small and Large Companies*. Macmillan. New Delhi.

Wesson, T. (1999): A model of asset-seeking foreign direct investment driven by demand conditions. *Canadian Journal of Administrative Sciences*, Vol. 16, pp. 1-10.

World Bank (2007): *Global Development Finance 2007: The Globalization of Corporate Finance in Developing Countries*. World Bank. Washington D.C.

Yoshihara (1988): *The Rise of Ersatz Capital in South-East Asia*. Oxford University Press. Oxford.

Yudaeva, K. and K. Kozlov and N. Melentieva and N. Ponomareva (2003): Does Foreign Ownership Matter? The Russian Experience. *The Economics of Transition*, Vol. 2, pp. 383-410.

Zoepf, S. (1996): Wie kann ein post-sozialistisches Kaderwesen in ein marktwirtschaftliches Personalwesen transformiert werden?. In: Groenewald, H. and B. Leblanc (eds.): *Personalarbeit auf Marktwirtschaftskurs. Transformationsprozesse im Joint Venture Skoda – Volkswagen*. Luchterhand.

Zukowska-Gagelmann, K. (2001): *Productivity Spillovers from Foreign Direct Investment. The Case of Poland*. Peter Lang Verlag. Frankfurt/Main.