

DISSERTATION

Titel der Dissertation

„Essays on Foreign Direct Investment“

Verfasser

Mag. rer. soc. oec. Goran Vukšić

angestrebter akademischer Grad

Doktor der Sozial- und Wirtschaftswissenschaften
(Dr. rer. soc. oec.)

Wien, im November 2007

Studienkennzahl lt. Studienblatt: A 084 140

Dissertationsgebiet lt. Studienblatt: Volkswirtschaft

Betreuer: O. Univ.-Prof. Mag. Dr. Gerhard Clemenz

Contents

List of tables	v
List of figures	vi
Introduction	1
Chapter 1	
On Fiscal Policy in Competition for Foreign Direct Investment: When Does a Less Developed Country Win?	3
1.1 Introduction	3
1.2 Empirical research on competition for foreign direct investment	5
1.3 Related theoretical models	8
1.4 Discussion of possible different assumptions of the model	14
1.4.1 Market size and trade costs	14
1.4.2 Public inputs	16
1.4.3 Different sources of asymmetry between competing countries	16
1.4.4 Employment and wages	17
1.4.5 Spillover effects	18
1.5 The model	18
1.5.1 Structure of competing economies and the differences	19
1.5.2 Foreign investor	23
1.6 Competition for FDI	24
1.6.1 The case without tax discrimination	24
1.6.2 The case with tax discrimination	33
1.6.3 Cleared labor markets in competing countries	43
1.7 Conclusions	45
<i>Appendix 1-A: Explanation for $\pi(G)$, with $\partial\pi/\partial G > 0$ and $\partial^2\pi/\partial G^2 < 0$</i>	48
<i>Appendix 1-B: Simulations</i>	51
<i>Appendix 1-C: Complete solution of the maximization problem in competition for FDI with tax discrimination</i>	54

Chapter 2	
Foreign Direct Investment and Export Performance of the Transition Countries in Central and Eastern Europe	57
2.1 Introduction	57
2.2 Theoretical considerations	60
2.2.1 Standard international trade theory	60
2.2.2 Theory of multinational enterprise	62
2.2.3 Possible channels of indirect influence	66
2.3 Previous empirical findings	69
2.4 FDI in CEE – Determinants and nature of FDI inflows and potential impact on exports	73
2.5 Model specification and the data	79
2.6 Empirical results	84
2.7 Conclusions	89
Chapter 3	
Impact of Foreign Direct Investment on Croatian Manufacturing Exports	93
3.1 Introduction	93
3.2 Some important developments in Croatian economy since the stabilization program	95
3.3 Data and the model	100
3.4 Results	108
3.5 Conclusions and policy recommendations	113
<i>Appendix 3-A: Manufacturing industry by branches (NCEA)</i>	115
<i>Appendix 3-B: Random effects estimations</i>	116
References	117
Zusammenfassung	125
Curriculum Vitae	127

List of tables

Table 1-B1: Results of simulations (for $\gamma \in \{0.1, 0.4, 0.7\}$)	52
Table 2.1: Expected trade effects from different types of FDI in the host country perspective	62
Table 2.2: FDI inflow and stock in CEE countries, in %, 1993-2001	74
Table 2.3: Descriptive statistics	83
Table 2.4: Correlation coefficients	83
Table 2.5: Complete sample, results I	85
Table 2.6: Complete sample, results II	86
Table 2.7: New EU member states, results I	87
Table 2.8: New EU member states, results II	87
Table 2.9: Southeast Europe, Russia and Ukraine, results I	88
Table 2.10: Southeast Europe, Russia and Ukraine, results II	89
Table 3.1: Macroeconomic performance 1994-2002	96
Table 3.2: Current account – Goods and services, in millions USD	98
Table 3.3: Descriptive statistics of variables by branches	105
Table 3.4: Correlations	106
Table 3.5: Results of fixed effects estimations I	109
Table 3.6: Results for potential instruments of productivity variable	110
Table 3.7: Results of fixed effects estimations II	111
Table 3-B1: Results of random effects estimations I	116
Table 3-B2: Results of random effects estimations II	116

List of figures

Figure 1.1: Optimal policy with FDI without tax discrimination	27
Figure 1.2: Attainable and not attainable G^*	28
Figure 1.3: Optimal supply of public inputs with FDI	39
Figure 1.4: Cleared labor markets	44
Figure 2.1: FDI stock and exports	77
Figure 3.1: Exports of Croatian manufacturing industry 1996-2002	101
Figure 3.2: Exports and FDI stock 1996-2002	102
Figure 3.3: Exports, productivity, investment, unit labor costs and real effective exchange rate	103

Introduction

This dissertation comprises three separate essays on foreign direct investment, presented in three chapters. The first chapter is a theoretical essay on competition for foreign direct investment among countries at different stages of development. The question it tries to answer is when less developed countries can win in this kind of competition. It is assumed that domestic companies in a more developed country use more capital in production, and that wages in a less developed country are lower. The paper explicitly models the empirical observation that countries tend to compete for foreign direct investment by providing public inputs, in addition to (or instead of) offering subsidies or tax reliefs to foreign investors. However, while only a foreign company benefits from tax incentives, additional public inputs increase the output of domestic companies as well. The results reveal that if governments of competing countries are not allowed to discriminate between domestic and foreign firms, there may be situations in which a less developed economy will attract foreign direct investment depending on the labor cost differential and the responsiveness of foreign and domestic companies to changes in the supply of public inputs. In addition, including public inputs in the model may alter the result as compared to including another location determinant that cannot be affected by public policy. There are situations in which consideration of public inputs will increase a less developed country's chances of winning the investment. If tax discrimination between domestic and foreign firms is permitted, both countries will optimally raise the supply of public inputs but the more developed country will always win the foreign investment.

The second and the third chapters are empirical papers which investigate whether foreign direct investment inflows promote exports of host countries. The second chapter tests this relationship for 14 transition economies of Central and Eastern Europe, over the period between 1993 and 2001. It is well known that besides the direct effects of foreign direct investment on export performance, i.e. the exports of subsidiaries of multinationals, there are also potential indirect effects of foreign direct investment on the host economy and thus possibly on exports, for example through technology transfers and knowledge spillovers. Until now, there has been no study for these countries at the aggregate, macroeconomic level which would encompass the overall, direct and indirect effects of foreign direct investment on exports at the same time. The results suggest that, along with real effective

exchange rates and development on export markets, foreign direct investment has been a significant determinant of export performance for the whole sample as well as for the two subsamples, in various model specifications.

The third chapter is a refinement of the analysis in the second chapter. It uses sectoral level data to test for the relationship between foreign direct investment inflows and the exports of the Croatian manufacturing industry. The exports of the Croatian manufacturing industry have been stagnating over the last decade or so. Over the same period there have been relatively high inflows of foreign direct investment into industry. Using the panel data approach for 21 branches of the manufacturing industry over the period between 1996 and 2002, it is found that foreign direct investment has had a positive and statistically significant impact on exports: a 1% increase in inward FDI stock leads to a 0.09% increase of exports. This implies that there is a potential for improving the export performance of the Croatian manufacturing industry by attracting more foreign direct investment into this sector. Policy makers should try to enhance the potential positive effects of foreign investment by targeting specifically export-oriented foreign direct investment, and, in addition, implement measures to increase potential spillover effects.

Chapter 1:

On Fiscal Policy in Competition for Foreign Direct Investment: When Does a Less Developed Country Win?

Abstract

This paper analyzes the competition for foreign direct investment among countries at different stages of development, and asks when less developed countries can win in this kind of competition. It is assumed that domestic companies in a more developed country use more capital in production, and that wages in a less developed country are lower. The paper explicitly models the empirical observation that countries tend to compete for foreign direct investment by providing public inputs, in addition to (or instead of) offering subsidies or tax reliefs to foreign investors. However, while only a foreign company benefits from tax incentives, additional public inputs increase the output of domestic companies as well. The results reveal that if governments of competing countries are not allowed to discriminate between domestic and foreign firms, there may be situations in which a less developed economy will attract foreign direct investment depending on the labor cost differential and the responsiveness of foreign and domestic companies to changes in the supply of public inputs. In addition, including public inputs in the model may alter the result as compared to including another location determinant that cannot be affected by public policy. There are situations in which consideration of public inputs will increase a less developed country's chances of winning the investment. If tax discrimination between domestic and foreign firms is permitted, both countries will optimally raise the supply of public inputs but the more developed country will always win the foreign investment.

1.1 Introduction

It is a recognized fact that foreign direct investment (FDI) can bring more to host countries than just additional financial capital. FDI inflows are often associated with additional beneficial effects such as increased employment, enhanced management skills, knowledge in general, new technologies, higher wages and access to export markets. Admittedly, the

empirical evidence of all these potential consequences of FDI is not always convincing. Also, the mentioned effects are all positive, but even if not all of the consequences of FDI for the host economy can be regarded as beneficial (e.g. profit shifting from domestic companies), there is a strong consensus in the literature that the positive effects prevail in many cases. These effects are especially important in the context of economic development and represent a reason why countries, trying to promote economic growth, i.e. increase welfare, engage in competition for FDI.

Competing countries can influence FDI flows up to a certain level by using fiscal policy instruments as strategic tools. For example, governments of competing countries can offer financial subsidies or tax reliefs to foreign investors,¹ or they can invest in additional production of public inputs which may be of productive use to a foreign investor as well as to domestic producers. Both of these policies need to be financed by a higher tax burden on domestic producers. Since competing countries are not the same, their optimal policies usually differ.

Earlier theoretical contributions did not analyze the situation in which asymmetric competing countries at different stages of economic development have two different instruments for influencing a foreign investor's location decision: provision of public inputs and/or tax reliefs. This paper aims to fill this gap in the theoretical work. Moreover, it models the competition between countries at different stages of development taking into account at the same time the effect of employment creation due to FDI. As in the majority of tax competition models (see e.g. Wilson and Wildasin 2004 for an overview), the only tax instrument considered is capital tax. Asymmetry between competing countries is created by the assumption of differences in the availability of domestically owned capital (in absolute terms, as well as relative to labor endowments, which are assumed to be equal in competing countries), instead of by the assumption of e.g. differences in market size. Therefore, the paper also provides a new perspective on the issue of why capital does or does not flow to capital-scarce, i.e. less developed, countries. The crucial assumption is that domestic firms are not large enough to be mobile (nor is the domestic capital employed in those firms). The larger domestic capital stock in a more developed economy

¹ Throughout the paper, the terms tax relief and subsidies will be used interchangeably. The usual distinction would require tax relief to denote a situation in which a foreign investor pays taxes at lower, but positive, tax rate than domestic producers, while subsidies to foreign investor would mean a negative tax rate for a foreign investor. It is not crucial for the purpose of this analysis to make such a distinction.

automatically implies a larger (immobile) tax base. Since the market size aspect is neglected (due to its seemingly having been sufficiently explored in other related papers), the model is better suited for explaining the competition for export-oriented investment. In addition, the paper analyzes two regimes: with and without the possibility of tax discrimination between domestic and foreign companies. In such an improved theoretical framework, old questions will be addressed: which (asymmetric) country will win in the competition for FDI, and under what conditions? Thus, the paper investigates the competition for foreign direct investment and its consequences in the context of economic development, rather than asking whether, for example, competition for foreign capital is efficiency-increasing or wasteful.

The chapter is organized as follows: section 1.2 gives a review of some results of the empirical research on competition for FDI. Thereafter, in section 1.3, the related theoretical work is briefly presented. This is done in order to identify the relevant empirical aspects that have not yet been considered in theoretical studies, and thus, to motivate the hypotheses for the new model, which are discussed in section 1.4. The outline of the new model is given in section 1.5, which is followed by the formal analysis. Section 1.7 concludes the chapter.

1.2 Empirical research on competition for foreign direct investment

The significance and intensity of the competition for FDI has increased as a consequence of the fall of barriers to international investment, and of the reduced importance of market size due to the globalization of the world economy (Oman 2000). This is true for developing, but also for industrialized countries and for some industries and projects more than for the others. Blomström and Kokko (2003) speak about the shift of attitude among many of the developing countries, which have recognized the potential beneficial effects of FDI.² But a shift of attitude is not enough to attract FDI. Countries must offer appropriate conditions. Through offering a competitive environment they may engage in “bidding wars”, which are of the “prisoner’s dilemma” nature. Because market size has become less

² In the period between 1991 and 2000, around 95% of the 1,185 changes of national legislation related to FDI, were favorable to foreign investors (UNCTAD 2001).

important due to globalization, small countries are able successfully to compete as well, intensifying the competition even further (Blomström and Kokko 2003).³

There are different types of incentives that can be used as instruments for attracting FDI, the most important categories being financial subsidies, i.e. direct payments to foreign investors, and fiscal measures such as tax reliefs.⁴ However, the perception of the influence of such incentives on FDI location choices differs considerably between governments and managers of multinational enterprises. A number of interview surveys and econometric studies conclude that they do not seem to have a crucial impact on the decisions of foreign investors (Morisset and Pirnia 1999). The reason for such findings may be that the incentives are more or less matched by competitor countries. However, their effectiveness varies depending on the type of investment and on the competitors. Their impact is higher on export-oriented companies than on those seeking the domestic market or location-specific advantages (Morisset and Pirnia 1999). Moreover, it is likely to be stronger in the competition for FDI within regions, or, in general, the more similar other determinants of location decisions are, such as country size or access to output markets, production costs, or infrastructure (Blomström and Kokko 2003). Use of incentives to attract foreign investment is usually justified by the expected additional beneficial effects of the foreign investment on the host economy. Blomström and Kokko (2003) emphasize beneficial spillover effects on local producers in this context, but there may be other positive influences as well. Multinational enterprises do not consider such spillover effects in their private assessment of the costs and benefits of investment, which leads to socially suboptimal levels of FDI. Incentives can be used to achieve socially optimal FDI levels. The problem is that differences in other factors, such as country size or production costs, together with expected gains from FDI, influence each country's optimal incentives scheme. But "neither policy making nor formal theory, have focused much effort on matching the size of subsidies to the amount of expected spillover benefits: instead, it is assumed that the spillover benefits are sufficiently large to justify investment incentives." (Blomström and Kokko 2003, p. 9).

³ Ekholm et al. (2003) analyze the location decision of an export-oriented FDI in which the foreign investor chooses between low-cost small country and large country. A low-cost small country is chosen as the only production location for an MNE in the case of trade liberalization. However, this paper does not consider the role of fiscal policy.

⁴ Haaparanta (1996) and Bjorvatn and Eckel (2006) describe some specific cases of countries using incentives in competition for FDI. Extensive overviews are found in Oman (2000) and UNCTAD (1996).

It has often been stated that financial subsidies and tax reliefs cannot compensate for all the drawbacks of a given competing country. As Oman (2000) argues, the location decisions of multinational enterprises are a two-stage process in which investors first draw up a short list of acceptable sites on the basis of the economic and political “fundamentals”, only later inviting the short-list countries to compete for investment and then considering other determinants and investment incentives. These fundamentals largely coincide with the most important factors considered by the investors, which, according to the OECD (2003) include:

- A predictable and non-discriminatory regulatory environment and an absence of undue administrative impediments to business more generally.
- A stable macroeconomic environment, including access to international trade.
- Sufficient and accessible resources, including the presence of the relevant infrastructure and human capital.⁵

In addition, investors search for healthy business environments in general so that, for example, countries should also provide (or improve): a transparent public sector, an effective system of courts and law enforcement, the right of free transfers related to investments, and an environment that facilitates exports. It is important to stress that these factors mostly have (at least partly) the character of a public good.

In this context, Oman (2000) finds that competition for FDI may not only weaken public finances, but may also put excessive downward pressure on global standards of protection of the environment and/or of workers' rights.⁶ These examples show that there are policies that can positively affect a foreign investor's expected profit, but which may be considered as “a public bad”. On the other hand, an important beneficial effect of the competition is that the competing governments also tend to make efforts to modernize the infrastructure, increase local productivity-enhancing human-capital formation, and improve the overall business environment as parts of investment promotion policy. Such policies can be a powerful means of attracting FDI, but also independently of the FDI flows, of promoting

⁵ The availability of infrastructure and of human capital is also an important determinant of multinational firm's location for the developed countries as found by Coughlin and Segev (2000) for the regional allocation of new foreign-owned manufacturing plants within the USA.

⁶ Markusen et al. (1995) model a competition in environmental policies which affect location decisions of firms.

economic development, because such measures result in benefits for domestic producers as well. However, empirical findings from Oman (2000) reveal that there might be a trade-off between using public resources for financial and fiscal incentives in competition for FDI, and using these resources for other purposes mentioned above (which may be helpful in attracting FDI but also in promoting economic development independently of FDI flows).

The above observation is at the heart of this paper. When trying to attract a foreign investor different countries may want to offer to the foreign investor tax reliefs and/or increase the supply of public inputs in order to increase his profit contingent on the investment actually taking place. Investing in public inputs such as the infrastructure, better public educational institutions or a more efficient judiciary can help in attracting FDI but it also benefits domestic producers. Since countries are different, their optimal supply of public inputs with and without FDI may also differ as well as the associated tax rates needed to finance this supply of public inputs. In addition, there may be other differences among competing countries, i.e. other determinants of FDI location that may not so easily be affected by the government. Empirically, other than geographical position and the market size aspect, probably the most important factors are the different wages in developing and developed countries. On the other hand, the different relative sizes of potential beneficial effects from FDI justify the different maximal subsidies countries can offer to a potential investor. In their assessment of optimal policy in attracting FDI, policy makers are often mostly concerned about additional employment and additional labor income created by the foreign investor (see e.g. Haaparanta 1996, who gives additional references).

1.3 Related theoretical models

The models of competition for FDI are closely related to public finance tax competition theory. In tax competition theory, regions or countries mostly compete to attract scarce mobile capital. They usually do this through reductions in tax rates.⁷ In these models, indefinitely small capital movements are allowed for, i.e., capital stock is “continuous”. The central question tax competition literature addresses is whether and when such competition is either wasteful or welfare-increasing. Throughout the 1970s and 1980s, the

⁷ In general, governments try to extend their tax base so that the mobile capital does not have to be the only object of competition. There are other possibilities, such as competition for cross-border shoppers. In addition, as noted above, non-tax instruments like expenditure or regulatory policies can also be effective means in tax competition (Wilson 1999).

predominant opinion of economists was that tax competition is wasteful (Wilson 1999).⁸ Zodrow and Mieszkowski (1986) showed in a very influential paper that competition is wasteful if (symmetric) competing countries' only possibility of financing their expenditures is by the taxation of mobile capital. Subsequent research dealt with cases of asymmetric tax competition, and the basic result was that a smaller country can benefit from competition, while a bigger country will lose from it (Bucovetsky 1991, Wilson 1991). Different extensions of the initial tax competition models identified additional inefficiencies, while the more recent models point out that there are also welfare-enhancing effects of competition.

Unlike in the public finance models of tax competition, the literature on competition for foreign direct investment assumes countries to be competing for lumpy investment, meaning that no indefinite small increments of capital stock are possible. One could think of this as distinguishing between capital and firm mobility. Admittedly, this distinction is not always recognized in the literature (e.g. Haaparanta 1996, uses the term FDI to describe perfectly divisible investment). This strain of economic literature reveals additional dimensions of investor location decisions, other than different tax rates, such as the significance of country size (which is equivalent to market size), transportation costs or production costs. The competing countries engage in "bidding for firms", in which they also consider the extra benefits (other than an enlargement of the tax base) that a country can receive from foreign investment. Possible subsidies should reflect the value of the investment for the host country. The central question of these models becomes: which country wins the competition and under what conditions?

The related models for the present paper are those focusing on competition for a single mobile firm (except in one case) among asymmetric countries, which mostly consider additional beneficial effects from FDI for the host economy, other than the broader tax base. In addition, some attention is given to the models in which public inputs are used as an instrument in competition for FDI among symmetric countries.

Although he models the competition for FDI assuming perfectly divisible investment, Haaparanta's (1996) model considers additional benefits for the host economy in the form

⁸ It should be mentioned that only in the second half of the 1980s did economists first start formalizing the earlier intuitive ideas on tax competition.

of reduced unemployment. Moreover, the distinctive feature of his study is that he assumes two sources of asymmetry: different exogenously fixed wage rates (which create unemployment) and different country size. As it turns out, in his model, the larger country (market) attracts the higher share of investment, *ceteris paribus*. Also, without subsidies, a high-wage country will attract relatively less investment than a low-wage country. Haaparanta shows that depending on the elasticity of substitution between capital and labor, with subsidies, a high-wage country may be able to attract more foreign capital if the elasticity of substitution is low.

Haufler and Wooton (1999) model a situation in which two countries of different sizes try to attract a foreign monopolist (the investor faces no regional competition for his product). A country that wins a competition can levy a profit tax. It is known from the trade literature that trade (transportation) costs create a “home market bias” and may play an important role as an agglomeration force. As it turns out, transportation costs are the crucial assumption in the setting by Haufler and Wooton (in the paper by Haaparanta 1996, there are no transportation costs). They create an incentive for the multinational firm to locate closer to the larger market i.e. in the large country, in order to maximize profit. Other things being equal, a large country will attract the investor. This means that a large country can set a higher profit tax rate and still attract FDI. In addition, in the same paper, Haufler and Wooton replace trade costs by another policy instrument, which can be interpreted as a tariff or a consumption tax. They show that both countries will impose positive tariffs if they import the good produced by the multinational firm, and the large country’s optimal tariff will be higher because of its greater monopoly power in trade. Along with the market size effect from the first setting with exogenous trade costs, which created a large market bias for the investor, there is now an additional incentive in the same direction. This results from the fact that if the consumers in a large country buy an imported product, they face a higher tariff than those in a smaller country. The endogeneity of the trade costs strengthens the bargaining power of the large country, which can offer a less favorable tax treatment to the firm and still win the investment.

Barros and Cabral (2000) analyze competition between two countries for FDI from a third country. The countries differ in size and in the level of unemployment i.e., the larger country is assumed to be without unemployment. There are no local firms and the gain for the countries induced by the foreign investor lies in the higher consumer surplus and in

addition, employment creation, if he invests in the small country with unemployment. Since there are positive transportation costs, the larger country wins the investment if there is no government intervention, through a mechanism similar to that in Haufler and Wooton (1999). Allowing subsidies can change this, since the smaller country gains more from foreign investment because of unemployment. Barros and Cabral (2000) also find that subsidy competition may induce efficiency gains and increase aggregate welfare.

In the study by Fumagalli (2003) there is a local firm in each of the two competing economies and a foreign company – a potential foreign investor. All of the firms compete in the same market. The gains from FDI for the host economy consist of spillover effects that lower the local marginal costs of production of local firms and this beneficial effect is stronger in a depressed region. In the absence of investment incentives, a foreign company's preferred location will be the more advanced region since this limits the extent of spillovers. This is called the "protection" argument for the location decision of the foreign investor. Subsidies may affect the location decision of a foreign company so that it will invest in the less developed region where it will generate higher benefits. If there are high differences between competing countries in terms of technological level, allowing subsidies may be welfare-improving. Fumagalli (2003) also studies a case in which a foreign company does not invest in any of the competing regions but serves their markets through exports. The intensity of competition is lower in this case because of the positive trade costs that the foreign company is facing in serving local markets through exports. Allowing subsidies may induce investment that otherwise would not take place.

Bjorvatn and Eckel (2006) analyze the situation in which competing countries differ in size, and there is a local firm in the larger country, a competitor to a foreign investor in the regional market. Thus, the two markets are not equally competitive. They also study an extension of the model in which there is unemployment in both competing countries and the shadow price of labor is the same across the countries. The results imply that without unemployment, policy competition increases the relative profitability of the foreign investor if he locates in the smaller, but less competitive country. This may be reversed in the case with employment creation since the job creation effect is stronger in the larger country and it may outweigh the profit-shifting effect. The aggregate welfare of the countries may decrease due to competition if the countries are not very different from each

other with respect to location advantages. In cases when policy competition causes the foreign investor to change his location decision, competition increases aggregate welfare.

The studies briefly described above introduce asymmetry between competing countries by assuming different market size and/or by making different assumptions about employment or unemployment. None of them, however, considers the aspect that some forms of public expenditures may also be important in making a country more attractive to a foreign investor, but also simultaneously may improve the productivity of domestic companies as well (moreover, domestic companies are rarely modeled at all). There are studies that assume the possibility of using public inputs in competition for FDI, but only in a symmetric framework.

One of them is the paper by Walz and Wellisch (1996). In their model two firms are initially located in two different regions and produce a homogenous good for a third market. Governments are assumed to levy profit taxes and provide local public inputs which reduce firms' marginal costs under the assumption of balanced government budgets. Regions are symmetric and only one firm is mobile. There are agglomeration benefits – the (partial) public good character of the local inputs, and agglomeration costs – fixed costs associated with the change of a firm's location. In their model, the agglomeration solution, in which both companies produce in the same region, is more likely to emerge. Governments provide inefficiently high levels of public goods even if firms do not locate together because of the strategic trade effect.

King et al. (1993) present another model in which public investment is a relevant location determinant in competition for FDI between two symmetric regions. They find that despite the symmetric competing regions, it is efficient for governments to choose different levels of infrastructure in the first stage of a two-stage game.

It should be stressed at this point that in some related models that assume public goods, these sometimes enter the utility function of the consumers and not the production function of firms. The exceptions are the extension of the basic public finance tax competition model by Zodrow and Mieszkowski (1986), other public finance tax competition models such as Bayindir-Upmann (1998) or Matsumoto (1998), and the mentioned models by Walz and Wellisch (1996) and by King et al. (1993). One paper in which both types of

public good are included is the contribution by Keen and Marchand (1997). They analyze the composition of public spending, distinguishing between public goods that are consumed and those that are relevant for firms. According to them, the first group corresponds to e.g. recreational facilities or social services, while the second group comprises items such as infrastructure or general training expenditures. Keen and Marchand (1997) state that in practice, many types of public expenditure have the character of consumption good as well as of production input, claiming that this “distinction is important in both analytical and policy terms” (Keen and Marchand 1997, p. 34). They also say that the public goods considered should really be public such as e.g. a national highway network, and not targeted to specific firms.⁹ The results of Keen and Marchand (1997) imply that there is a tendency towards the overprovision of public goods used by firms for productive purposes and an underprovision of public goods that enter the utility function of the consumers. All of these analyses in which public inputs are considered have been carried out in symmetric settings and the market size aspects are neglected in each of those models.

It seems that in deciding on which aspects to model in the context of competition for FDI, there exists an analogy to international trade literature in general, which also partly deals with FDI. Markusen (2005) views trade theory as “consisting of a portfolio of models”. He also states, in the general context of trade theory, that: “There are many underlying causes of or motives for trade, and it is probably productive to have a series of models analyzing just a few of these at a time rather than attempt one grand model which includes all possible bases for trade. At the other extreme, we could envision a model for every industry and every country pair and perhaps every multinational firm. At this point, theory coincides with case-study analysis and we learn nothing of any generality. So a parsimonious set of models, the number of elements greater than one but less than say one thousand, is probably a good scientific objective.” (Markusen 2005, p. 1).

Recognizing the applicability of the above views to the context of competition for FDI, the effects and relevant variables to be included in the new model, as well as the neglected ones, are discussed and chosen in the following section.

⁹ See section 1.2 for examples of other determinants of location decision that may be influenced by public expenditures.

1.4 Discussion of possible different assumptions of the model

The present paper analyses competition for FDI between countries at different stages of development. The governments may use public inputs and/or tax reliefs to influence the foreign investor's location decision. There are host country benefits through employment gains and a broader tax base. Some relevant aspects included in the previous models are neglected or modified in the present paper.

1.4.1 Market size and trade costs

One of the sufficiently explored dimensions of a foreign investor's location decision is the market size of a competing country and the trade costs. As stated by Barros and Cabral (2000, p. 370), country size may be viewed as a metaphor for centrality and it is "relevant only insofar as it affects total transportation costs." As noted earlier, the importance of market size reduces as a consequence of globalization so that small countries can also successfully compete for FDI. Also, empirical research shows that the incentives offered to foreign investors have a stronger impact on export-oriented companies, probably reflecting the fact that better market access is a motive in itself for (some kinds of) foreign investors, making them less responsive to tax policies. This is reflected in the results of other theoretical contributions, such as that of Haufler and Wooton (1999) in which the larger country (market) clearly has the advantage in competition for FDI. In addition, in the earlier models of competition for FDI, foreign investment is usually assumed to be at least partly export-oriented, in that an investor will choose to locate the production in one of the two competing countries and supply both markets from this location. However, this assumption seems rather restrictive in the sense that it assumes the competing countries to be isolated from the rest of the world. Or it implicitly assumes that both countries offer equal market access to third countries (as noted by Bjorvatn and Eckel 2006). If, on the other hand, foreign investment is assumed to be exclusively oriented at serving local markets (i.e. FDI in a non-tradable sector), then there should be no competition for FDI, because ability to supply a local market requires the presence of the foreign investor in each country.

The usual assumption that a foreign investor is partly export-oriented and chooses between two countries of different size, would imply that locating a production plant in e.g., the Saxony region in Germany offers better market access (due to the fact that Germany is a larger country) than locating it, e.g., anywhere in Belgium. However, market access indicators calculated by Schürmann and Talaat (2000), which also consider transportation costs, show exactly the opposite. This is at least partly due to the fact that locating in Belgium offers better market access to a part of the German market than locating in some German regions, as a consequence of the common market in the EU. Also, other countries neighboring on Belgium offer larger market access than the countries neighboring on the eastern German regions. Trade costs do not only depend on geographical position, but also on the quality of traffic and transportation infrastructure, which may be considered to be (at least partly) a public input.

While market access cannot be discarded as an irrelevant determinant in a foreign investor's location decision, doubts can be raised as to whether market access can always be well approximated with the competing countries' market size, without considering the transport infrastructure. It seems likely that a more developed country will have an advantage when this aspect is considered, due to its better infrastructure. Barros and Cabral (2000) use market size as an approximation of centrality, which may be interpreted as assuming that a larger country is a more developed country. However, in the context of competing countries at different stages of development, Makino et al. (2004) state that access to a market is an important motive for FDI in both groups of countries (developed and less developed), but while developed countries' markets are usually larger and more competitive, the markets of less developed countries tend to grow faster and are characterized by relatively weak competition. Thus, it cannot be a priori stated that high developed countries' markets are more attractive for each FDI. In addition, one should bear in mind that for some types of FDI, trade costs play only a marginal role, e.g. for some globally traded services, such as software development or the back offices of multinational companies. In a globalized world, without administrative barriers to trade, market access of different locations for this type of investment does not differ much. For these reasons, the model in this paper does not explicitly consider market access as an important variable, since it is difficult to predict which country would have an advantage due to better market access and since this aspect has been sufficiently explored in earlier models. Implicitly, this means that market potential is the same in both countries and does not affect the choice

of location. This simplification enables the present model to focus on other mechanisms relevant for the location decision of a foreign investor.

1.4.2 Public inputs

Public inputs in production have been included even in the extension of the basic tax competition model, as well as in some more recent models dealing with lumpy FDI. In addition, a review of the empirical literature reveals that they are an important factor in foreign investor location decision. However, the role of public inputs in competition for FDI has never been explored in an asymmetric setting and in a model in which foreign investment is associated with additional beneficial effects for the host economy, apart from that of a broader tax base. This is the most important distinctive feature of this paper as compared to the earlier theoretical models. The difference between public inputs and subsidies or tax reliefs as instruments in attracting FDI is that the level of public inputs also affects domestic firms. Also, the observation by Oman (2000), that the use of public resources for incentives tends more to compete than to augment the use of public resources for modernizing the infrastructure, increasing local productivity-enhancing human-capital formation or improving the overall business environment as parts of investment promotion policy should be explicitly built into the model. In order for public inputs to be an important determinant of the location decision of a foreign investor, it must be assumed that his profit depends positively on the supply of public goods. Since competing countries are asymmetric, they have different optimal supplies of public inputs, and the marginal increase of public inputs in two countries should yield a different marginal increase of a foreign investor's profit in the two countries.

1.4.3 Different sources of asymmetry between competing countries

Since competition for FDI is especially important in the context of economic development, the new model should emphasize this fact, modeling the countries as differing in the availability of capital in domestic firms' production processes. Such an assumption reflects indisputable empirical observation, and leads to higher resident income in a capital-abundant country. It may be in contradiction to the predictions of neoclassical models, according to which capital should move to countries where it is scarce. However, such a prediction is not empirically confirmed. The immobility of part of domestic capital from a

rich to a poor competing country can be explained by the fact that international investment is usually carried out by large multinational companies and that the capital stock employed in the sector of small enterprises may be internationally immobile (see Helpman 2006). In the existing literature, there are different sources of asymmetry among competing countries such as different market size, employment and unemployment or different wage rates. Admittedly, one could argue that these (especially the latter aspect) can be understood as defining the countries as being at different levels of development.

1.4.4 Employment and wages

Whether there is additional employment in host economies due to FDI depends on whether one starts out with the assumption of full employment in (one of) the competing countries. Again, a glance at the data reveals that the assumption of full employment or smaller unemployment in a more developed country does not always have to hold, one possible example being Slovenia and Germany. According to Eurostat (2005a), German GDP per capita in 2004 amounted to an index value of 109 (with 100 being the EU25 average). In the same year, the value of this index for Slovenia was 78. However, the unemployment rate in Germany in 2004 amounted to 10.3%, while in Slovenia it was only 6.3% (Eurostat 2005b). Similar conclusions are valid if the data for Czech Republic or Hungary are compared with the data for the more developed France or Spain (Eurostat 2005a and 2005b). Admittedly, situations in which a more developed country also has a lower unemployment rate are probably more common, but this still does not mean that one additional (foreign) investment project will raise the overall wage level. This would probably depend on the availability of specific workers required by the potential investor. But the situation in which workers with the needed skills among the unemployed population are scarce, causing the wages for this type of worker to rise as a consequence of FDI, may also arise in a less developed country. For these reasons, the new model starts by assuming unemployment in both countries (by introducing exogenously given minimum wages), and measuring the value of additional employment by the wage rate as in Haaparanta (1996). This assumption is then relaxed in the later section of the paper in which labor market clearing wages will be assumed.

1.4.5 Spillover effects

Many studies on FDI also assume positive spillover effects for host economies, but the empirical evidence on their existence is not always convincing (Görg and Greenaway 2004). While this may be due to methodological problems, or problems with the availability of adequate data, still, the relative size of these effects in different countries is very difficult to determine. As stated by Fumagalli (2003) such effects may be relevant for the group of middle income countries, which have sufficient “absorptive capacity”, but still lag behind the technologically most advanced countries, so that there will exist know-how that can actually spill over to domestic producers. In her study, Fumagalli (2003) assumes stronger positive spillover effects in the less developed (middle income) country. This assumption turns out to be crucial for some results of her model, possibly reducing the general applicability of her findings. Since the assumed relative size of the beneficial effects for the host economy may be crucial for the outcome of the competition for FDI and since the results from Fumagalli (2003) sufficiently explain the effects of different assumptions related to spillovers, this study does not consider potential spillover effects.

1.5 The model

The world consists of two countries competing for a lumpy foreign investment and a third country, which is the rest of the world, an export market and the source of the foreign direct investment. Markets are assumed to be perfectly integrated with no administrative trade barriers and with tariffs and transportation costs both equal to zero. These assumptions eliminate the size of markets in the competing countries and their proximity to export markets as important determinants in the location decision of the foreign investor. It is assumed that the foreign investor will invest in one, and only one, of the two competing countries.¹⁰ The countries are at different levels of development (this being the source of asymmetry), which is reflected in the fact that the high developed country has a larger capital stock and higher wages. It is assumed that labor endowments in the two countries are equal, so that high developed country has larger capital stock in absolute terms, but also relative to labor endowment. It is further assumed that the levels of the economies’ “fundamentals” are not lower than the minimum level needed in order for the foreign

¹⁰ A similar assumption is made in most of the related papers. This may be imposed by assumptions about the fixed costs of foreign investment, as stated by Haufler and Wooton (1999).

investor to consider a country as a potential production location (see section 1.2). Domestic firms in the competing countries produce a homogenous product, which is used as a numeraire good. The demand function for their product is exogenously given, and the firms are assumed to be price-takers on the world market which can sell their whole output at some exogenously given world price. Domestic firms in different countries do not compete with the foreign company, which produces a different product.¹¹ It plays no role where the consumption of domestic companies' and the foreign investor's products takes place, i.e. in either one or both of the competing countries or in the export market.¹²

Governments can raise capital tax from domestic firms and the foreign investor (contingent on his investment decision) and use the revenue for the production of public inputs that enter the production function for all domestic producers and also affect the profit of the foreign investor in the country in which he decides to invest. Thus, a higher supply of public goods can help attract the foreign investor by itself. Two regimes will be analyzed. In the first one, governments are not allowed to discriminate between domestic and foreign firms in taxation. In the second regime, governments can discriminate between domestic firms and a foreign investor, so that the government may, for example, tax domestic producers and subsidize a foreign investor in addition to (or instead of) providing (additional) public inputs. Governments run balanced budgets and are assumed to determine the tax rates for domestic and foreign producers (which then determine the supply of public goods) in such a way as to maximize the real disposable income in their economies.

1.5.1 Structure of competing economies and the differences

There are n companies in each competing economy, which are engaged in perfect competition. For the simplicity of exposition, n is normalized to 1. They produce a single good and their technology is described by the production function with three arguments: capital, labor and public inputs: $F(K, L, G)$. K and L stand for the capital and labor

¹¹ In some other related papers (e.g. Fumagalli 2003, Walz and Wellisch 1996, Janeba 1998, Bjorvatn and Eckel 2006), all the companies produce a homogenous good and compete in quantities (à la Cournot). In this paper, this is simplified. It must be stressed that Barros and Cabral (2000) and Haaparanta (1996) do not model domestic companies at all, and that in their papers the only interaction between host economies is the governments' competition for FDI. Also, Haaparanta explicitly assumes that there are different markets for products produced in different countries.

¹² Admittedly, in a welfare analysis this statement would not be true.

employed by the single firm, but since n is normalized to 1, they are equal to the overall economy's capital stock and employed labor. It is assumed that neither domestically owned capital nor labor is internationally mobile. It is known that international foreign direct investment is usually carried out by large multinational companies and one can think of domestic production as the small enterprise sector.¹³ G denotes the overall supply of public goods in the economy. Thus, public goods are used for productive purposes without any rivalry among firms. They are not consumed but enter the production function of firms.

The production function is assumed to have the following properties: if the value of any of the arguments is equal to zero, the value of the function is also equal to zero. The first derivative of the production function with respect to public inputs is positive, while the second is negative. Also, the first derivative of the output function with respect to G at point $G = 0$ is infinitely large. However, in order not to over-complicate the analysis, the ratio between capital and labor employed in domestically owned firms is assumed not to be affected by the supply of public inputs. This is done in order to prevent additional supply of public inputs from inducing additional employment in the firm (since capital stock per firm is fixed), although it may affect the marginal productivity of labor or capital. Only if capital employed in a single firm were higher would this lead to higher employment in that firm. This is basically the assumption of Leontief technology in domestic companies, in which factors' productivity is affected by the supply of public inputs and where capital is the limiting factor in the production of domestic firms¹⁴:

$$F(K, L, G) = g(G) \min(K, L) = g(G)K, \text{ with } \frac{\partial g}{\partial G} > 0, \left. \frac{\partial g}{\partial G} \right|_{G=0} = +\infty \text{ and } \frac{\partial^2 g}{\partial G^2} < 0. \quad (1.1)$$

¹³ The recent literature on trade and FDI clearly shows that only the largest and most productive companies engage in FDI (see Helpman 2006). Thus, domestic companies may be considered to be too small and/or not productive enough (although they still may be able to export – a property which requires smaller size and productivity than those needed in order for a firm to become a multinational enterprise). The assumption that domestic firms are not mobile is quite usual in related models (see e.g. Haaland and Wooton 1999, or Haufler and Wooton 1999), even in the settings with imperfect competition and oligopolistic domestic companies (e.g. Fumagalli 2003). However, in Zodrow and Mieszkowski (1986) and in Keen and Marchand (1997), as in other public finance tax competition models, there is no difference between domestic and foreign capital and all of the capital is mobile.

¹⁴ For simplicity of notation (especially in later sections), the general form of the domestic firms' output function is used in the rest of the paper.

Government levies capital tax in order to finance the supply of public inputs:¹⁵

$$KT = G, \text{ with } G, T \geq 0, \quad (1.2)$$

where T denotes tax rate on domestic capital K . Government maximizes its residents' real disposable income denoted by W .¹⁶ Since domestic companies are completely owned by the residents, their real disposable income is equal to:

$$W = F(K, L, G) - KT. \quad (1.3)$$

The optimal policy for the country is to set the capital tax rate at $T = \bar{T}$ in which income is maximized, i.e. the following condition is fulfilled:

$$\frac{\partial F}{\partial G} \frac{\partial G}{\partial T} = K, \text{ or } \frac{\partial F}{\partial G} K = K \text{ i.e. } \frac{\partial F}{\partial G} = 1. \quad (1.4)$$

Since in this simplest case there is no foreign investment, only domestic capital is being taxed, so that such a policy defines the corresponding maximizing value of $G = \bar{G}$ and maximized income $W = \bar{W}$, which will later be referred to as reservation income for the competing country, or income without FDI.

As mentioned above, the structure of the competing countries is the same. However, the aim is to analyze a situation in which one of the two countries competing for FDI is at higher stage of development than the other. These differences in the stage of development are introduced by assuming differences in the availability of domestic capital in the competing countries' domestic companies:

$$K_H > K_U. \quad (1.5)$$

¹⁵ That capital tax is used as the only tax instrument is clearly a strong simplification; nevertheless, it is used in most of the tax competition models (see e.g. Wilson and Wildasin 2004).

¹⁶ The variables which are maximized by the governments in related models include e.g. welfare defined by a utility function or by the producers' and/or consumers' surplus but also residents' income. An example for the latter case is the contribution by Haaparanta (1996) in which governments maximize the net wage income generated by the foreign investment.

The subscripts H and U stand for a high developed and an underdeveloped country, respectively. The assumed properties of domestic firms' production function (fixed ratio between capital and labor employed in domestic firms) together with assumption (1.5) lead to higher employment in a high developed country¹⁷:

$$L_H > L_U . \quad (1.6)$$

In addition, the analysis starts with the assumption of an administrative minimum wage and an infinite labor supply at the minimum wages in both countries.¹⁸ The administrative minimum wage assumption will be relaxed in the later section. Wages in an underdeveloped country are assumed to be lower than in a high developed country, which is an empirically observed fact:

$$w_H > w_U . \quad (1.7)$$

It is easy to verify that the assumption (1.5) leads to a higher equilibrium supply of public inputs in high developed country, in the situation without FDI:

$$\bar{G}_H > \bar{G}_U . \quad (1.8)$$

Thus, since the only tax instrument is capital taxation, the high developed country will have a broader immobile tax base implying a higher optimal supply of public inputs and higher residents' income. Admittedly, the greater capital stock country may be viewed as a larger country in competition with a smaller one. However, in this interpretation, the difference in size stems from the difference in endowments and has nothing to do with the size of markets as in other related papers.

¹⁷ It should be recalled again that labor endowments in both countries are equal, only the employment in the more developed country being higher. The more developed country has larger capital stock in absolute terms, as well as relative to labor endowments, but not relative to employment.

¹⁸ Barros and Cabral (2000) assume unemployment in only one of the competing countries, this being the source of asymmetry. Haaparanta (1996) assumes unemployment in both competing countries, but at different, exogenously given wages. In his model, the value of new employment is measured by the wage rate.

1.5.2 Foreign investor

The profit of the foreign investor, denoted as Π , is given by:

$$\Pi = \pi(G) - L^m w - K^m T^m, \quad (1.9)$$

where T^m stands for the tax rate on a fixed amount of foreign capital K^m . Thus, government may (be allowed to) discriminate in taxation between domestic and foreign companies. As has been mentioned, there is an infinite supply of labor at the wage rate w . L^m denotes the additional employment created by the foreign investor. It is further assumed that the foreign investor's demand for labor is determined by the characteristics of the investment project and is therefore equal regardless of where it decides to locate (despite the differences in wage rates).¹⁹ This assumption of fixed K^m and L^m is restrictive as compared to other possible approaches. However, this paper deals with one specific investment project. In reality, multinational companies usually know exactly what activities they want to undertake in another country and to what extent. Thus, they know how much capital they want (need) to invest and they know the labor demand for this specific project. Sharing this information with competing countries and inviting them to participate in competition is a necessary first step, because only after having such information can countries decide on their policies. In addition, the assumption that the characteristics of foreign firm are given and independent of countries' policies and known to competing countries is quite usual in related models (although they do not all explicitly define it by the amount of invested capital or labor demand).²⁰

The foreign investor's profit is positively related to the supply of public inputs. More specifically:

$$0 < \frac{\partial \pi}{\partial G} < 1 \text{ and } \frac{\partial^2 \pi}{\partial G^2} < 0. \quad (1.10)$$

¹⁹ This can be imposed (or formalized) by assuming a Leontief-type production function for the foreign investor with a given fixed amount of foreign capital.

²⁰ See e.g. Fumagalli (2003), Barros and Cabral (2000) or Haufler and Wooton (1999).

The assumption that $\partial\pi/\partial G < 1$ is imposed since otherwise the foreign investor would have an incentive to provide public inputs privately. The above formulation and properties of the foreign investor's profit function are discussed in Appendix 1-A.

The foreign investor faces an opportunity cost when investing in the competing country, i.e. the profit that this company could have made by investing elsewhere, denoted by $\tilde{\Pi}$. First, this profit will be assumed to be exogenously given, fixed and non-negative. The foreign investor will choose to invest in the competing economy only if $\Pi \geq \tilde{\Pi}$.²¹

As noted above, the host economy is assumed to benefit from additional employment income. The residents' income with FDI equals:

$$W = F(K, L, G) - KT + L^m w. \quad (1.11)$$

But under the assumption that the foreign investor decides to invest in the competing country there arises the possibility of taxing or subsidizing the foreign investor. This means that now:

$$KT + K^m T^m = G, \text{ with } G \geq 0. \quad (1.12)$$

1.6 Competition for FDI

1.6.1 The case without tax discrimination

The majority of related models on competition for FDI define policy competition for FDI as a situation in which countries may differentiate in taxation between domestic and foreign companies, or may simply give subsidies to the foreign investor. However, in reality, competition for FDI is possible even without applying different tax rates for domestic and foreign companies. In this section, the situation in which a government is not allowed to discriminate in taxation between foreign and domestic producers is analyzed, i.e. there is only one tax rate T .

²¹ It is possible to introduce a tie-breaking rule, but this is not crucial for the results.

The government's maximization problem is the following:

$$\max_T W = F(K, L, G) - KT + L^m w \quad (1.13)$$

such that

$$G = (K + K^m)T > 0 \quad (1.14)$$

$$\Pi \geq \tilde{\Pi} \quad (1.15)$$

$$W \geq \bar{W} . \quad (1.16)$$

First, constraints (1.15) and (1.16) are neglected and their effect is analyzed later. In the situation with a foreign investor, the optimality condition for supply of public inputs is equal to:

$$\frac{\partial F}{\partial G} \frac{\partial G}{\partial T} = K, \text{ i.e. } \frac{\partial F}{\partial G} = \frac{K}{K + K^m}, \quad (1.17)$$

which is not fulfilled at \bar{G} any more because of the broader tax base. The optimal supply of public inputs that fulfills the new condition is now higher $\hat{G} > \bar{G}$. (The variables for the case with FDI in which condition (1.17) is fulfilled are denoted with \hat{T}, \hat{G} and \hat{W} .) Comparing residents' income in these two situations, one obtains:

$$\hat{W} - \bar{W} = [F(K, L, \hat{G}) - F(K, L, \bar{G})] - (K\hat{T} - K\bar{T}) + L^m w . \quad (1.18)$$

It is clear that the residents' income with FDI without discrimination in taxation is higher than without FDI, i.e. $\hat{W} - \bar{W} > 0$. The above expression is always positive since the term in the first bracket (additional output of domestic companies due to higher supply of public goods) is always higher than the term in second bracket (possibly higher tax burden).²² The third term is additional labor income because of the additional employment created by foreign investment. Therefore, the government will always prefer the situation with FDI in

²² Note that the tax burden for domestic producers may also be lower in the case with FDI. This is the case if: $K^m \hat{T} > \hat{G} - \bar{G}$.

which $T = \widehat{T}$, $G = \widehat{G}$ to the situation without FDI i.e. $\widehat{W} > \overline{W}$ and condition (1.16) is satisfied.

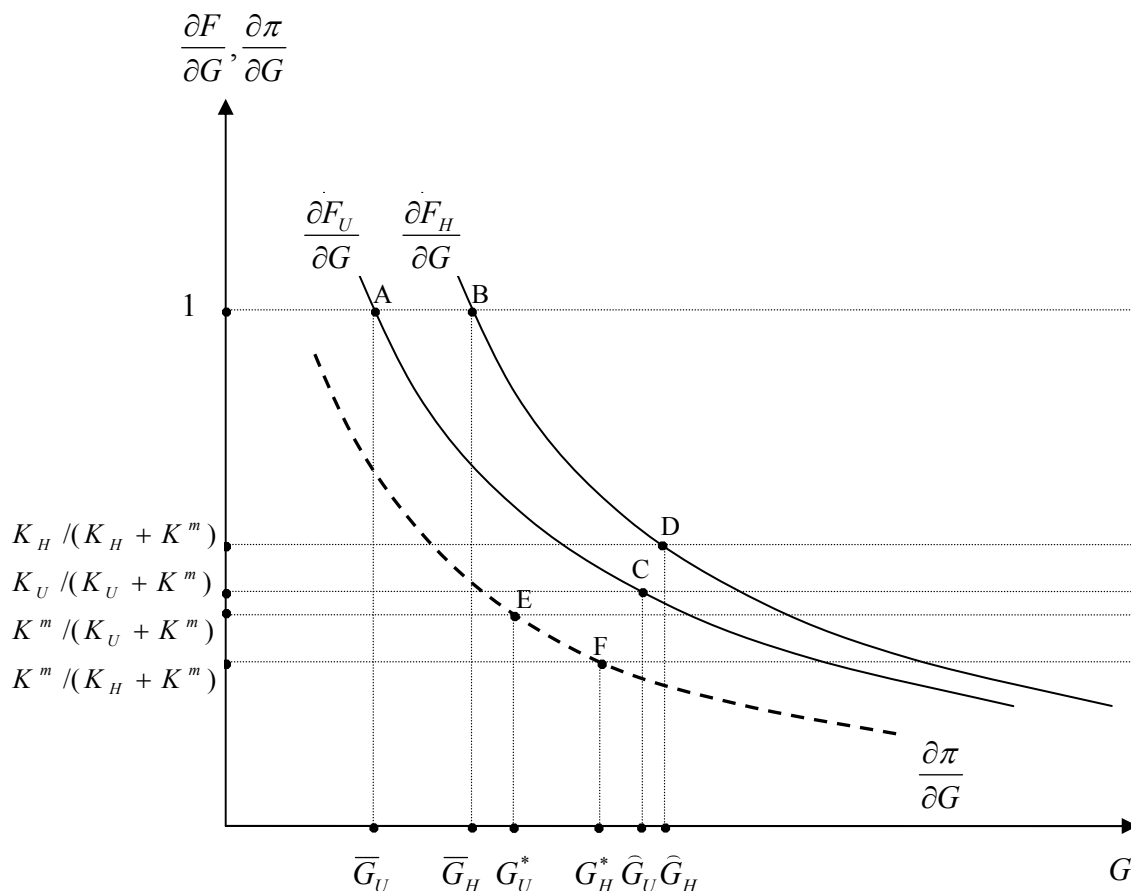
The profit of a foreign investor at \widehat{G} is denoted with $\widehat{\Pi}$. In deciding on its fiscal policy, the government did not take the profit of a foreign investor into consideration and thus, the fact that a potential foreign investor may not be willing to invest under such circumstances. Recall that for $G = \widehat{G}$ a foreign investor will only invest in the country if $\widehat{\Pi} \geq \widetilde{\Pi}$. If $\widehat{\Pi} < \widetilde{\Pi}$ the government must do something to increase the investor's potential profit in order to make him invest in the competing country.

The optimal supply of public inputs from a foreign investor's perspective is obtained by differentiating equation (1.9) with respect to tax rate and setting the expression equal to zero. This yields following condition:

$$\frac{\partial \pi}{\partial G} = \frac{K^m}{K + K^m}. \quad (1.19)$$

The optimal supply of public inputs from the foreign investor's perspective is denoted by G^* and the corresponding (single) tax rate by T^* . The situation with FDI and with no tax discrimination is shown in Figure 1.1. It is drawn under the assumption that $K^m < K_U$ and that the $\partial \pi / \partial G$ curve lies below the $\partial F_U / \partial G$ curve. The initial situation in competing countries is depicted by points A and B , at which the optimality condition (1.4) is fulfilled for the underdeveloped and the high developed country, respectively. Thus, the supply of public inputs in the two countries is equal to \overline{G}_U for the underdeveloped and \overline{G}_H for the high developed country. The optimal supply with FDI increases and is equal to \widehat{G}_U for the underdeveloped and \widehat{G}_H for the high developed country. The relative sizes of \widehat{G}_U and \widehat{G}_H depend on the relative sizes of K_U and K_H . If the relative difference between K_H and K_U increases (e.g. as compared to Figure 1.1, K_H increases and K_U remains the same), it is possible for \widehat{G}_U to be higher than \widehat{G}_H . Also, G_H^* can be higher than \widehat{G}_H . It can also be easily verified that for $K^m > K_{H,U}$ situations may arise in which $G_{H,U}^*$ is lower than $\overline{G}_{H,U}$, if the $\partial \pi / \partial G$ curve lies below the $\partial F_U / \partial G$ curve.

Figure 1.1: Optimal policy with FDI without tax discrimination

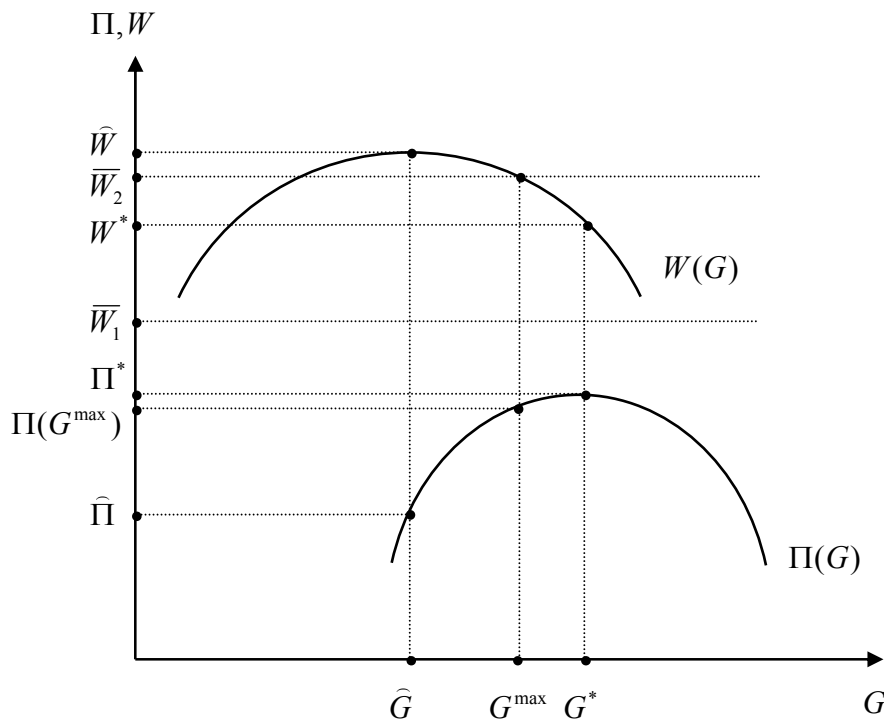


As obvious from the Figure 1.1, the foreign investor's profit is not necessarily maximized at any of these two supplies of public goods, \hat{G}_U and \hat{G}_H . Thus, there are ways to increase the potential profit of the foreign investor by deviating from \hat{G}_U or \hat{G}_H . In any of the two countries, if $G^* > \hat{G}$, government can increase the foreign investor's profit by increasing the supply of public inputs beyond \hat{G} . The opposite holds good for $G^* < \hat{G}$. This implies that if e.g. $\hat{\Pi}_U < \hat{\Pi}_H$ the underdeveloped country should bring the supply of public inputs "closer" to G_U^* in order to increase investor's potential profit and possibly win the investment. The government is constrained with inequality (1.16), stating that the residents' income with FDI should never be lower than their income without FDI. In addition, once the point G^* has been reached, governments cannot do anything to increase the foreign investor's profit because it is maximized. Of course, because of constraint (1.16) this can only happen if $W^* \geq \bar{W}$ (where W^* denotes residents' income at G^*), i.e. if

G^* is attainable. If G^* is not attainable in the above sense, then a country may still change the supply of public inputs in order to increase the foreign investor's profit. If $G^* > \hat{G}$ it will increase the tax rate and the supply of public inputs up to the point in which $W = \bar{W}$. This amount then defines the maximal attainable supply of public inputs denoted by G^{\max} and the corresponding profit of the foreign investor $\Pi(G^{\max})$.

These situations are described in Figure 1.2. When the reservation residents' income is equal to \bar{W}_1 , G^* is attainable, as distinct from the case when the reservation residents' income is \bar{W}_2 , in which case the maximal attainable supply of public inputs equals G^{\max} and the maximal profit of foreign investment amounts to $\Pi(G^{\max})$. The analogous situation applies to the case in which $G^* < \hat{G}$, leading to a minimal attainable amount of public inputs denoted by G^{\min} .

Figure 1.2: Attainable and not attainable G^*



Formulating the above situation as a non-cooperative game, countries' strategy spaces can be written as (note that tax rates too can be used as strategic variables instead of public inputs):

$$G \in [\widehat{G}, \min(G^{\max}, G^*)], \text{ for each } G^* > \widehat{G}, \quad (1.20)$$

and

$$G \in [\widehat{G}, \max(G^{\min}, G^*)], \text{ for each } G^* < \widehat{G}. \quad (1.21)$$

In general, the strategy space for both countries is $G \in R^+$, but as shown in the above discussion, it may be restricted to subsets of R^+ defined in (1.20) and (1.21) without loss of generality. The maximal profit of the foreign investor Π^{\max} is obtained at G^* , if the latter is attainable, or at G^{\max} or G^{\min} , depending on the relative size of G^* and \widehat{G} . The best response functions are:

$$G_U(\Pi_H) = \dot{G}_U, \text{ such that } \Pi_U(\dot{G}_U) = \Pi_H(G_H) + \varepsilon, \quad (1.22)$$

$$G_H(\Pi_U) = \dot{G}_H, \text{ such that } \Pi_H(\dot{G}_H) = \Pi_U(G_U) + \varepsilon, \quad (1.23)$$

where ε is a positive and small value. As noted by Barros and Cabral (2000), this game has the nature of Bertrand competition. Following their approach, the problems of equilibrium existence in asymmetric Bertrand games are ignored and in the rest of the paper the value of ε is neglected.²³

Thus, if $\Pi_U(\dot{G}_U) > \Pi_H(G_H^*)$, the underdeveloped country receives the investment and analogously if $\Pi_H(\dot{G}_H) > \Pi_U(G_U^*)$ then the foreign investor will choose to locate in the high developed country. If G^* is not attainable, then the underdeveloped country wins if $\Pi_U(\dot{G}_U) > \max(\Pi_H(G_H^{\max}), \Pi_H(G_H^{\min}))$, and the high developed country wins if $\Pi_H(\dot{G}_H) > \max(\Pi_U(G_U^{\max}), \Pi_U(G_U^{\min}))$.

²³ As stated by Barros and Cabral (2000), an equilibrium exists if the strategy values must fall on a small but positive grid of width ε , but not otherwise.

In the next step, the situation is analyzed in which G^* is attainable for both countries, meaning that constraint (1.16) is not effective at G^* . The maximal profit of foreign investor is then equal to:

$$\Pi^{\max} = \pi(G^*) - T^* K^m - L^m w. \quad (1.24)$$

The difference between the foreign investor's profit in two countries is then:

$$\Pi_H^{\max} - \Pi_U^{\max} = (\pi(G_H^*) - \pi(G_U^*)) - (T_H^* K^m - T_U^* K^m) - (L^m w_H - L^m w_U). \quad (1.25)$$

The sign of the above expression then determines for which country constraint (1.15) is satisfied, i.e. which country wins the investment.

Proposition 1

In the case in which tax discrimination is not allowed for and $W^ \geq \bar{W}$ holds for both countries:*

- (i) *if wages are equal in both countries, i.e. if only the difference in tax rates and public inputs are considered, the high developed country will always receive the investment;*
- (ii) *the underdeveloped country will receive the investment if the difference in wages between two countries is sufficiently high i.e. if:*

$$L^m w_H - L^m w_U > (\pi(G_H^*) - \pi(G_U^*)) - (T_H^* K^m - T_U^* K^m). \quad (1.26)$$

Proof

- (i) Since $K_U < K_H$ it must always hold that $G_U^* < G_H^*$. If $w_H = w_U$ and $T_H \leq T_U$ it is obvious that expression (1.25) is positive and that the high developed country will win the investment. On the other hand, if $w_H = w_U$ and $T_H > T_U$, then the foreign investor bears a higher tax burden in the high developed country equal to $K^m (T_H - T_U)$. From condition (1.19), it is known that for every $G < G_H^*$, it must

hold that $\partial\pi/\partial G > K^m/(K_H + K^m)$. The difference in public inputs between the two countries is equal to $G_H^* - G_U^* = T_H(K_H + K^m) - T_U(K_U + K^m)$. Then it must hold that:

$$\pi(G_H^*) - \pi(G_U^*) > \left[K^m / (K_H + K^m) \right] \left[T_H(K_H + K^m) - T_U(K_U + K^m) \right],$$

i.e. that $\pi(G_H^*) - \pi(G_U^*) > T_H K^m - T_U K^m \underbrace{\left[(K_U + K^m) / (K_H + K^m) \right]}_{<1}$.

Thus, $\pi(G_H^*) - \pi(G_U^*) - K^m(T_H - T_U) > 0$ and the high developed country will always receive the FDI.

- (ii) This part is obvious: wages are exogenously given and do not depend on public inputs or tax rates. Also, the supply of public inputs and the tax rates are not affected by wages, so that for some given labor demand by foreign investor L^m there always exists $w_H > w_U$ such that condition (1.26) is fulfilled. \square

It should be noted that the left hand side of inequality (1.26) (difference in total labor costs of the foreign investor) increases with higher L^m , for some given wage differential. This implies that for given amounts of domestic and foreign capital, less developed countries have better chances of winning the FDI if the foreign investment project is labor intensive, i.e. if L^m is high relative to K^m . If, on the other hand, labor demand by the foreign investor is relatively small, other location determinants gain in relative significance and the high developed country is more likely to attract the foreign investor.

Depending on the relative size of domestic and foreign capital stock, on the properties of output functions and of the foreign investor's profit function, many different situations are possible regarding the amounts and the relative size of G^* , \widehat{G} , G^{\max} and G^{\min} in the two countries. It is not the aim of this paper to analyze each of these possible situations. The important thing is that whatever the size of the expression on the right-hand side of inequality (1.26), there may always be a difference in labor costs which is sufficiently high for the underdeveloped country to obtain the investment. Also, one should note that if G^* is not attainable for either country, or only for the high developed country, situations may arise in which even a smaller labor cost differential may be needed in order for the less developed country to receive the FDI. In each case it holds that the less developed country

has better chances of obtaining the FDI, if the investment project is more labor intensive. This result, although intuitive and simple, was not derived in previous models.

In addition, considering public inputs as an important location determinant may have important consequences for the outcome of the competition, given some labor cost differential between countries. Assume for the moment that G represents an important location determinant that cannot be affected by the policy. Then, the partial initial advantage of the high developed country equals to $\pi(\bar{G}_H) - \pi(\bar{G}_U)$ and this needs to be compensated for by the less developed country if it wants to attract the foreign investor. In the absence of taxes the less developed country receives the FDI if $\pi(\bar{G}_H) - \pi(\bar{G}_U) < (L^m w_H - L^m w_U)$. Since in the present model the supply of public inputs optimally changes if the foreign investor decides to invest and countries' policies differ, inequality (1.26) must hold in order for the foreign investor to locate in the less developed country (assuming that G_H^* and G_U^* are both attainable, and since in this case the foreign investor has to pay taxes).

If it is possible that $\pi(\bar{G}_H) - \pi(\bar{G}_U) > (\pi(G_H^*) - \pi(G_U^*)) - (T_H^* K^m - T_U^* K^m)$, then consideration of public inputs in the location decision of the foreign investor may increase the less developed country's chances of obtaining the investment, simply because smaller differences in labor costs will be sufficient. Whether the above inequality holds crucially depends on the exact form of output functions and the profit function of the foreign investor. The many parameters involved and the fact that some of them are not directly interrelated make it difficult to determine the exact conditions under which this is the case. For this reason, simple simulations have been carried out in order to identify potential regularities. This is described in more detail in Appendix 1-B, for some simple functional forms. The results reveal that the above inequality holds for cases in which 1) the responsiveness of the foreign investor's profit to changes in the supply of public inputs is not much higher than the responsiveness of local firms' output, 2) the difference in domestic capital availability is not too big, and 3) the foreign investor invests a large amount of capital.

The above discussion implies that there should be systematic differences between FDI flowing into developed and less developed countries. Indeed, this is in line with empirical

observations. For example, a study by Makino et al. (2004), shows that FDI to less developed countries are “labor seeking”, while those to developed countries are “strategic asset seeking”.²⁴ The latter includes e.g. product development and planning, or R&D activities in general, which may be considered to depend (at least partly) on public expenditures on schooling, universities and research. In addition, developed countries are characterized by stronger property rights protection and enforcement mechanisms, which may be considered a public good. This may possibly explain the fact that those multinational companies that invest more in R&D and have stronger technological advantages in general tend to invest more in developed countries.

1.6.2 The case with tax discrimination

If the government is allowed to discriminate in taxation between domestic and foreign companies, its general maximization problem is:

$$\max_{T, T^m} W = F(K, L, G) - KT + L^m w, \quad (1.27)$$

such that

$$G = KT + K^m T^m, \quad (1.28)$$

$$\Pi \geq \tilde{\Pi}, \quad (1.29)$$

$$W \geq \bar{W}, \quad (1.30)$$

$$KT + K^m T^m \geq 0. \quad (1.31)$$

The above problem can be solved using the Kuhn-Tucker theorem in which the following function is defined:

$$L = F(K, L, G) - KT + L^m w + \lambda_1(\Pi - \tilde{\Pi}) + \lambda_2(W - \bar{W}) + \lambda_3(KT + K^m T^m). \quad (1.32)$$

²⁴ At the same time, FDI flows to both groups of countries are also found to be “market seeking”. While developed countries usually have larger markets with higher intensity of competition, less developed countries' markets are smaller, but with higher growth potential and less competitive. As noted earlier, this is another reason why one cannot be sure in general which market is more attractive for some specific FDI.

The equality constraint is plugged into the function. One obtains the following first-order conditions:

$$\frac{\partial L}{\partial T} = \frac{\partial F}{\partial G} K - K + \lambda_1 \frac{\partial \pi}{\partial G} K + \lambda_2 \left(\frac{\partial F}{\partial G} K - K \right) + \lambda_3 K = 0, \quad (1.33)$$

$$\frac{\partial L}{\partial T^m} = \frac{\partial F}{\partial G} K^m + \lambda_1 \left(\frac{\partial \pi}{\partial G} K^m - K^m \right) + \lambda_2 \frac{\partial F}{\partial G} K^m + \lambda_3 K^m = 0, \quad (1.34)$$

$$\frac{\partial L}{\partial \lambda_1} = \pi(G) - K^m T^m - L^m w - \tilde{\Pi} \geq 0, \quad \lambda_1 \geq 0, \quad \lambda_1 \frac{\partial L}{\partial \lambda_1} = 0, \quad (1.35)$$

$$\frac{\partial L}{\partial \lambda_2} = W - \bar{W} \geq 0, \quad \lambda_2 \geq 0, \quad \lambda_2 \frac{\partial L}{\partial \lambda_2} = 0, \quad (1.36)$$

$$\frac{\partial L}{\partial \lambda_3} = KT + K^m T^m \geq 0, \quad \lambda_3 \geq 0, \quad \lambda_3 \frac{\partial L}{\partial \lambda_3} = 0. \quad (1.37)$$

In order for the foreign investor to invest in the competing country, the potential profit of the foreign investor in this country must be higher than or equal to the profit it can make elsewhere. However, it is easy to see that residents' income is not maximized if $\Pi > \tilde{\Pi}$. Assuming that this is the case and that i.e. $\Pi = \tilde{\Pi} + \delta$, with $\delta > 0$, the government could simply increase the tax rate on foreign capital and decrease the tax rate for domestic firms keeping the budget constraint (1.28) fulfilled. A simple investigation of the objective function (1.27) shows that this increases residents' income because it reduces the tax burden on domestic firms for some given supply of public inputs, so that their output is not affected. As long as the additional amount that is taxed away from the foreign producer does not exceed δ , a foreign investor will still invest in the competing country. Therefore, in the first-order condition (1.35) it must hold that $\partial L / \partial \lambda_1 = 0$ and $\lambda_1 > 0$. In other words, all the solution candidates that include $\lambda_1 = 0$ are not maximizing solutions. The complete solution to the maximization problem is given in Appendix 1-C. The exposition here is restricted to two relevant cases.

Case 1: *Constraint (1.29) is effective and constraints (1.30) and (1.31) are not, i.e. $\lambda_2, \lambda_3 = 0$ and $\lambda_1 > 0$.*

Rearranging (1.33) yields:

$$\lambda_1 = (1 - \frac{\partial F}{\partial G}) / \frac{\partial \pi}{\partial G}. \quad (1.38)$$

Substituting expression (1.38) for λ_1 in (1.34) yields:

$$\frac{\partial \pi}{\partial G} = 1 - \frac{\partial F}{\partial G}. \quad (1.39)$$

This condition defines a unique optimal supply of public goods denoted by \hat{G} .

Case 2: Constraints (1.29) and (1.30) are effective and constraint (1.31) is not, i.e. $\lambda_3 = 0$ and $\lambda_1, \lambda_2 > 0$.

In this case, rearranging (1.33) yields:

$$\lambda_2 = (\frac{\partial F}{\partial G} - 1 + \lambda_1 \frac{\partial \pi}{\partial G}) / (1 - \frac{\partial F}{\partial G}). \quad (1.40)$$

Substituting the above expression in (1.34) yields again the condition (1.39). Thus, \hat{G} is the unique optimal supply of public goods regardless of the constraint (1.30).

Proposition 2

In a situation with FDI, the optimal supply of public goods is always higher than in a regime without FDI.

Proof

It is known that in a regime without FDI, the optimal supply of public goods \bar{G} is determined by condition (1.4). However, if evaluated at point \bar{G} it must hold that:

$$\left. \frac{\partial \pi}{\partial G} \right|_{\bar{G}} > 1 - \left. \frac{\partial F}{\partial G} \right|_{\bar{G}}, \quad (1.41)$$

since $1 - \frac{\partial F}{\partial G} \Big|_{\bar{G}} = 1 - 1 = 0$ and $\frac{\partial \pi}{\partial G} > 0$ by assumption.

If the supply of public inputs is increased relative to \bar{G} , the left hand side of inequality (1.41) decreases and the right hand side increases. Therefore, at some point $\hat{G} > \bar{G}$, the condition (1.39) must hold. \square

However, condition (1.39) does not determine the individual tax rates, i.e. how the tax burden for financing this supply is divided between domestic and foreign firms. In order to define those, the first-order condition (1.35) is used, evaluated at \hat{G} . This yields:

$$\hat{T}^m = (\pi(\hat{G}) - L^m w - \tilde{\Pi}) / K^m. \quad (1.42)$$

The above equation shows that if $\pi(\hat{G}) - L^m w > \tilde{\Pi}$, the country can tax away part of the foreign investor's profit and still win the competition. In that case $\hat{T}^m > 0$ and $\hat{T}^m K^m$ is the amount taxed away from the foreign investor. Otherwise, government must pay a subsidy to the foreign investor in order for (1.29) to hold with equality, which means that $\hat{T}^m < 0$ and the amount of subsidy is equal to $|\hat{T}^m K^m|$. Thus, for given \hat{G} and $\tilde{\Pi}$, \hat{T}^m is determined, which in return, because of budget constraint (1.28), defines \hat{T} :

$$\hat{T} = (\hat{G} - \pi(\hat{G}) + L^m w + \tilde{\Pi}) / K. \quad (1.43)$$

It is clear from (1.39), (1.42) and (1.43) that, unlike the optimal supply of public goods, the tax rates depend on the profit the foreign investor can make by investing in another country. The value function of the maximization problem using \hat{T}, \hat{T}^m and \hat{G} , i.e. substituting the expressions (1.42) and (1.43) for \hat{T} and \hat{T}^m in (1.27) is then:

$$\hat{W} = F(K, L, \hat{G}) - \hat{G} + \pi(\hat{G}) - \tilde{\Pi}. \quad (1.44)$$

Using the envelope theorem for (1.44) leads to the conclusion that the residents' income is negatively related to changes of the profit that a foreign investor can make elsewhere, i.e.:

$$\frac{d\hat{W}}{d\tilde{\Pi}} = -1. \quad (1.45)$$

From (1.42) and (1.43) it is also clear that:

$$\frac{dT^m}{d\tilde{\Pi}} = -\frac{1}{K^m}, \quad \frac{dT}{d\tilde{\Pi}} = \frac{1}{K} \quad \text{and} \quad \frac{dT}{dT^m} = -\frac{K^m}{K}. \quad (1.46)$$

The discussion above shows that at the point defined by \hat{T}, \hat{T}^m and \hat{G} residents' income is maximized for some profit of foreign investor such that constraint (1.29) holds with equality, under the assumption that constraint (1.30) is satisfied. Also, for any given profit of the foreign investor under the above conditions, \hat{G} is the optimal supply of public inputs, because it does not depend on the profit the foreign investor can make elsewhere, as shown by condition (1.39), nor does it depend on constraint (1.30). If in this situation the profit that the foreign investor can make elsewhere rises, because e.g. another country lowers the tax rate for foreign capital, then a competing country must do something to increase the foreign investor's profit in order for FDI to actually take place. The expressions in (1.46) imply that a country should lower T^m and increase T keeping the supply of public inputs unchanged at \hat{G} . As noted above in expression (1.45), this also reduces the residents' income.

However, constraint (1.30) must be fulfilled because otherwise the government prefers the situation without FDI. As a "tie-breaking" rule, it is assumed that the regime with FDI is preferred if $W = \bar{W}$, but this is not crucial for the following analysis. At this point, one can define the best response policies for two countries. Their strategic variables are T^m , T and G , in which any two of the variables define the third one, according to equation (1.28) and considering the non-negativity restriction for G . The strategy spaces are therefore: $T, T^m \in R$ and $G \in R^+$, such that (1.28) holds. The best response functions are:

$$G_U = \hat{G}_U, \quad T_U^m(\Pi_H) = \hat{T}_U^m \quad \text{such that} \quad \Pi_U(\hat{G}_U, \hat{T}_U^m) = \Pi_H(G_H, T_H^m) + \varepsilon, \quad (1.47)$$

$$G_H = \hat{G}_H, \quad T_H^m(\Pi_U) = \hat{T}_H^m \quad \text{such that} \quad \Pi_H(\hat{G}_H, \hat{T}_H^m) = \Pi_U(G_U, T_U^m) + \varepsilon, \quad (1.48)$$

where ε is a positive and small value. The best response functions are written in terms of T^m and G , which automatically define T . Again, following Barros and Cabral (2000), the problems of equilibrium existence in asymmetric Bertrand games are ignored and in the rest of the paper the value of ε is neglected. The governments are restricted by constraint (1.30), i.e. they will alter the supply of public inputs in order to increase a foreign investor's potential profit until the point is reached at which they are indifferent with respect to regimes with and without FDI. Constraint (1.30) with $G = \hat{G}$ may generally, for both countries, be rewritten as:

$$F(K, L, \hat{G}) - \hat{G} + T^m K^m + L^m w \geq F(K, L, \bar{G}) - \bar{G}. \quad (1.49)$$

Rearrangement yields:

$$-T^m K^m \leq \Delta F - \Delta G + L^m w, \quad (1.50)$$

in which $\Delta F = F(K, L, \hat{G}) - F(K, L, \bar{G})$ and $\Delta G = \hat{G} - \bar{G}$. Thus, the maximal subsidy that a government can pay to a foreign investor, or the minimal amount that must be taxed away from a foreign investor in order for constraint (1.30) to hold, equals the expression on the right-hand side of inequality (1.50). Substituting this right-hand side expression for $-T^m K^m$ in equation (1.9), the maximal profit that a foreign investor may earn in a competing country can be written as:

$$\Pi^{\max} = \pi(\hat{G}) + \Delta F - \Delta G, \quad (1.51)$$

or,

$$\Pi^{\max} = \pi(\bar{G}) + \Delta\pi + \Delta F - \Delta G, \quad (1.52)$$

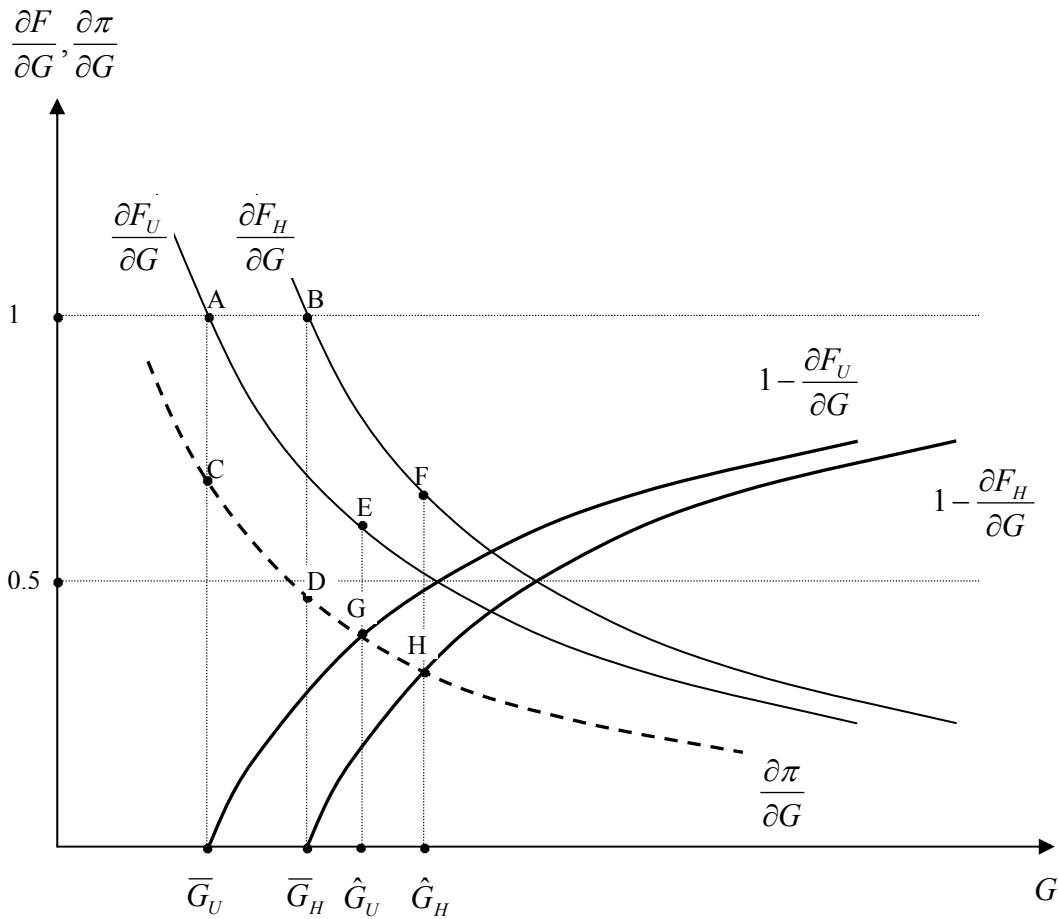
in which $\Delta\pi = \pi(\hat{G}) - \pi(\bar{G})$. Note that the labor costs do not affect the maximal profit of a foreign investor, since labor costs are equal to the gain from additional employment and

thus justify a subsidy of equal size. The foreign investor's decision is determined by the sign of the following expression:

$$\Pi_H^{\max} - \Pi_U^{\max} = \pi(\bar{G}_H) - \pi(\bar{G}_U) + \Delta F_H - \Delta F_U + \Delta\pi_H - \Delta\pi_U - (\Delta G_H - \Delta G_U). \quad (1.53)$$

If the expression (1.53) is positive, the high developed country will receive the investment. Otherwise, the foreign investor will locate in the less developed country. Figure 1.3 illustrates the given situation.

Figure 1.3: Optimal supply of public inputs with FDI



The part $\pi(\bar{G}_H) - \pi(\bar{G}_U)$ is equal to the area below the curve connecting the points C and D. The second part $\Delta F_H - \Delta F_U$ is the difference between the additional amounts of output in the high developed and the underdeveloped country and is represented by the difference in the areas below the curves connecting points A and E for the underdeveloped, and points B and F for the high developed country. An increase in the foreign investor's profit $\Delta\pi$

corresponds to the area below the curve connecting points C and G for the underdeveloped and points D and H for the high developed country. The last term $\Delta G_H - \Delta G_U$, simply gives the difference in the additional supply of public inputs between the countries.

Proposition 3

In competition for FDI with tax discrimination the high developed country will always receive the investment.

Proof

First note that condition (1.39) implies $\hat{G}_U < \hat{G}_H$. From condition (1.4) it is known that with every $G > \bar{G}$, it holds that $\partial F/\partial G < 1$, i.e. $\Delta F - \Delta G < 0$. Also note that because of (1.39), with every $G < \hat{G}$, it holds that $\partial F/\partial G + \partial \pi/\partial G > 1$, i.e. $\Delta F + \Delta \pi - \Delta G > 0$.

To prove Proposition 3, one needs to distinguish between two cases. In the first case $\hat{G}_U > \bar{G}_H$, as shown in Figure 1.3. Now, the following intervals are defined:

I : from \bar{G}_U to \bar{G}_H

II : from \bar{G}_H to \hat{G}_U

III : from \hat{G}_U to \hat{G}_H

Using the above definitions, ΔF^{II} , for example, stands for the increase in the output of one country due to an increase in the supply of public inputs from \bar{G}_H to \hat{G}_U . The expression (1.53) can also be divided into several segments. Denoting:

$$\Phi = \Pi_H^{\max} - \Pi_U^{\max}, \quad (1.54)$$

one can write:

$$\Phi = \pi(\bar{G}_H) - \pi(\bar{G}_U) + \Phi^I + \Phi^{II} + \Phi^{III}, \quad (1.55)$$

in which:

$$\Phi^I = -(\Delta F_U^I + \Delta \pi_U^I - \Delta G_U^I), \quad (1.56)$$

$$\Phi^{II} = \Delta F_H^{II} + \Delta \pi_H^{II} - \Delta G_H^{II} - (\Delta F_U^{II} + \Delta \pi_U^{II} - \Delta G_U^{II}), \quad (1.57)$$

$$\Phi^{III} = \Delta F_H^{III} + \Delta \pi_H^{III} - \Delta G_H^{III}. \quad (1.58)$$

If the last two intervals are neglected it is clear that $\Phi = \pi(\bar{G}_H) - \pi(\bar{G}_U) + \Phi^I > 0$. To see this, note that $\pi(\bar{G}_H) - \pi(\bar{G}_U) - \Delta \pi_U^I = 0$ and that $\Delta F_U^I - \Delta G_U^I < 0$ because of condition (1.4). Observing the second interval, one obtains $\Phi^{II} > 0$ because $\Delta F_H^{II} > \Delta F_U^{II}$, $\Delta \pi_H^{II} = \Delta \pi_U^{II}$ and $\Delta G_H^{II} = \Delta G_U^{II}$. Since because of condition (1.39) it must hold that $\Phi^{III} > 0$, it must also hold that $\Phi = \Pi_H^{\max} - \Pi_U^{\max} > 0$ and the high developed country always obtains the investment.

In the second case $\hat{G}_U \leq \bar{G}_H$. This implies that $\pi(\bar{G}_U) + \Delta \pi_U \leq \pi(\bar{G}_H)$. In addition it must hold because of condition (1.4) that $\Delta F_U - \Delta G_U < 0$, and because of condition (1.39) that $\Delta F_H + \Delta \Pi_H - \Delta G_H > 0$. Collecting terms yields $\Phi = \Pi_H^{\max} - \Pi_U^{\max} > 0$ and the high developed country will always be the destination of the investment. \square

The above Proposition demonstrates that in this simple approach the more developed country will always attract the FDI if it can discriminate in taxation between domestic and foreign producers. Recalling the results of previous models, this outcome is not surprising. For example, in Barros and Cabral (2000), the larger country had an initial advantage because of better market access. However, a smaller country could still win the FDI in situations in which it gains sufficiently more from the foreign investment, which would then justify the sufficiently higher subsidies it can accordingly offer to foreign investor. The crucial assumption was that in the smaller country there is an employment creation effect, unlike in the larger country. A similar situation arises in Fumagalli (2003), in which sufficiently higher gains in a less developed country through spillover effects are needed in order for this country to win the investment. In Bjorvatn and Eckel (2006), under the unemployment assumption, the larger country has higher job creation gains, which may dominate the profit shifting effect, leading to FDI in the larger country, although it has a more competitive market. In all of these models, higher gains in host countries do not

imply (equally) higher costs for the foreign investor, but they do justify higher possible subsidies to foreign investor.

In the present model, however, labor cost differentials are one-to-one reflected in different employment gains from FDI which justify equally different amounts of subsidies. In another words, with tax discrimination, tax rates depend on the wages giving the high developed country an opportunity for compensating for the difference in labor costs. This is also the case for the study by Haaparanta (1996) in the part in which he assumes a Leontief-type production function. The fact that this paper introduces public inputs as an important variable in competition for FDI (as compared to Haaparanta 1996) does not change anything in the outcome of competition in the case of tax discrimination between domestic and foreign producers.

On the other hand, in the case without tax discrimination, a country may not be able to “transfer” the whole potential gains to the foreign investor and increase his potential profit, because lowering the tax rate necessarily lowers the supply of public inputs. In other words, even if $W^* > \bar{W}$, a competing country cannot induce any further increase of a foreign investor’s potential profit. This implies that, without tax discrimination, a less developed country may receive the FDI even if its gains from FDI are smaller than in the high developed country. If G^* is attainable for both countries and the labor cost differential is sufficiently high, so that the underdeveloped country wins, then for a w_H sufficiently large as compared to w_U , the gains from FDI in a high developed country must exceed those in a less developed country. Since variables other than w_H remain unaffected, an underdeveloped economy still successfully attracts the foreign investment. In such situations, allowing for tax discrimination would reverse this result and the high developed country would then be the location for the FDI.

For the same reason, if a country sets the tax rate so that its residents’ income is maximized at \hat{T} , and if at this point it holds that $\hat{\Pi} > \tilde{\Pi}$, a competing country cannot do anything to tax away the extra profit of the foreign investor equal to $\hat{\Pi} - \tilde{\Pi}$ without tax discrimination, because increasing the tax rate also increases the tax burden for domestic firms and reduces income.

The next interesting question is what happens if one assumes cleared labor markets in competing countries.

1.6.3 Cleared labor markets in competing countries

In this section, the assumption of an exogenously given administrative minimum wage causing unemployment in competing economies is relaxed. Instead, cleared labor markets are a starting point. It is assumed that the labor endowment, denoted by L^S , is identical in both countries. The labor market clearing wage rate is then determined by the labor demand L :

$$w = w(L), \text{ with } \frac{\partial w}{\partial L} > 0, \text{ and } \frac{\partial^2 w}{\partial L^2} > 0, \quad (1.59)$$

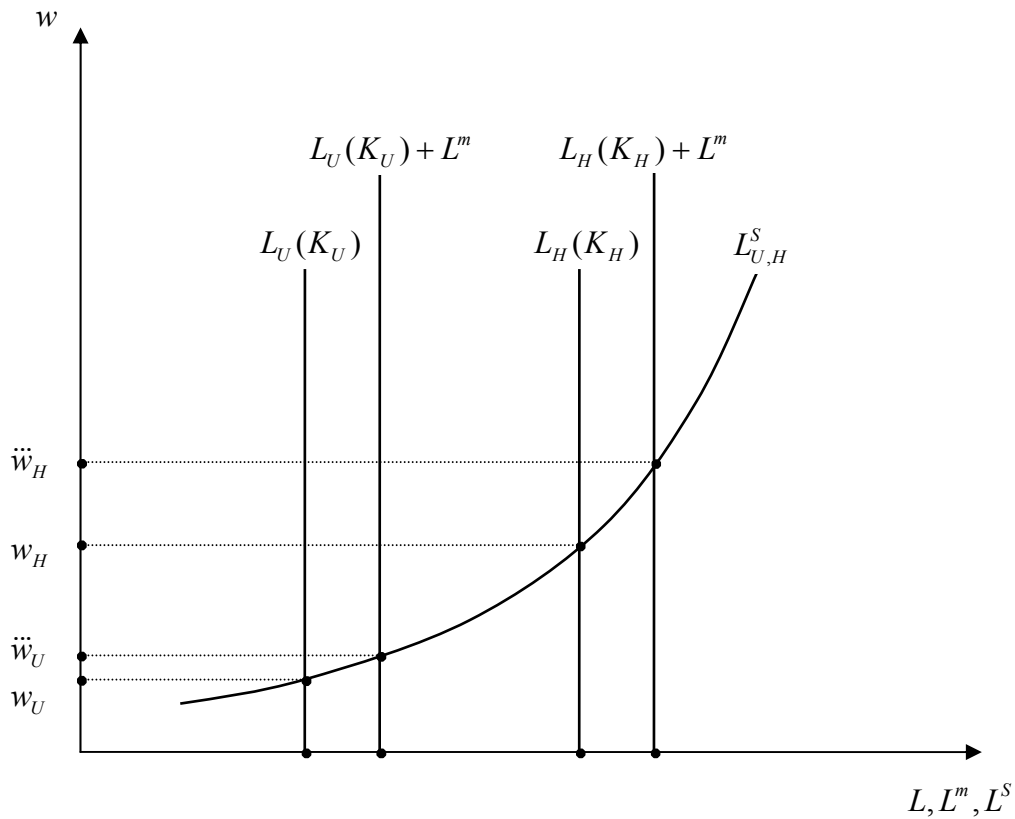
i.e. the labor supply curve is upward-sloping. Because of the Leontief production function of domestic firms, with capital being the limiting factor, the availability of capital defines the labor demand. The assumption of lower capital availability in a less developed country $K_U < K_H$ implies $L_U < L_H$, leading to $w_U(L_U) < w_H(L_H)$.

The optimal supply of public goods with and without FDI is unaffected by different assumptions on labor markets. The wages in the two countries increase due to the foreign investor's labor demand:

$$\ddot{w} = w(L + L^m) \quad (1.60)$$

in which L now stands for the labor demand of domestic companies (unchanged as compared to the case without foreign investor). The rise in wages in competing countries due to FDI is depicted in Figure 1.4.

Figure 1.4: Cleared labor markets



In the case with tax discrimination between domestic and foreign companies, the results of Proposition 3 remain unchanged and the high developed country always gets the FDI. This is because the higher labor costs in the high developed country are equal to higher gains from additional employment and higher wages in this country, which justifies the sufficiently higher subsidy. This can be easily seen if in all expressions from (1.42) to (1.53), in which the wage rate appears, the new wage rate \ddot{w} is substituted for the old one w .

In the case without tax discrimination between domestic and foreign companies, the optimal supply of public inputs and the labor demand of domestic producers are also unchanged. Since the second derivative of the labor supply function is positive, the rise of wages in the high developed country is stronger than in the underdeveloped country. In such a case, with attainable G^* for both countries, the left-hand side of the inequality (1.26) – difference in labor costs – would increase, increasing the chances of the less developed economy attracting the FDI. Otherwise, Proposition 1 remains unchanged.

The above discussion assumed that domestic companies are price takers in the world market and can sell their whole output at an exogenously given world price. Despite the rise in wages, they are still able to sell everything at the world price and make non-negative profit. If this assumption is altered, there may be consequences for the outcome of the competition for FDI. In general, the rise in wages may increase the marginal cost of production for domestic producers above the world price of their product. In the set-up of the present model, some domestic companies would have to exit the market, which would reduce the aggregate labor demand and wages to the level at which remaining firms make non-negative profit. It is beyond this model formally to study such cases. Intuitively, one could expect that if this (partial) negative effect were stronger in a more developed country, this might reverse the result of the competition in the case with tax discrimination.

1.7 Conclusions

The aim of this paper was to analyze the competition for FDI between countries at different stages of development. The model assumes different capital availability in local firms of two countries, leading to different optimal supplies of public inputs. Also, the empirically observed fact that wages are lower in less developed countries is built in the model. However, the main distinctive feature of this paper is that the model introduces public inputs as an important determinant of the location decision of a foreign investor in an asymmetric setting. Competing countries may offer subsidies or tax reliefs to foreign investor and/or may commit to increasing their spending on public inputs, contingent on the foreign investor's decision. While incentives are beneficial only for the foreign company, additional public inputs increase the output of domestic companies as well. The results reveal that if governments of competing countries are not allowed to discriminate between domestic and foreign firms, there may be situations in which a less developed economy attracts the foreign direct investment, depending on the labor cost differential and on the responsiveness of foreign and domestic companies to changes in the supply of public inputs. A less developed country can win the investment even when its gains from FDI are smaller than in a high developed country. In addition, including public inputs in the model may alter the result as compared to including another location determinant that cannot be affected by public policy. There are situations in which consideration of public inputs will increase the less developed country's chances of winning the investment. If tax

discrimination between domestic and foreign firms is permitted, both countries optimally raise the supply of public inputs but the more developed country will always attract the foreign investment. Qualitatively, the results do not change if cleared labor markets are assumed instead of administrative minimal wages causing unemployment in competing countries.

This simple set-up shows that consideration of public inputs may have consequences for the outcome of competition. It also shows that in each case, a country's optimal bid for a foreign investor necessarily involves increasing the supply of public inputs in the situation in which countries can discriminate between domestic and foreign producers. On the other hand, if discrimination is not possible, the optimal supply of public inputs from host countries' perspectives is always higher with FDI. However, this must not be profit-maximizing for the foreign investor, and if countries have to compete for FDI in such a way that they deviate from their optimal supply of public inputs, situations may arise in which the public inputs supply is lower than in the case without a foreign investor. These conclusions justify and indeed necessitate the inclusion of public inputs as location determinant.

The results of this paper imply that governments of less developed countries may have an incentive to work on an international agreement to disallow tax discrimination i.e. subsidies, unless they are convinced that the gain from FDI in their countries is sufficiently higher than in high developed countries and that this difference is not reflected in different costs for the foreign investor. In such situations less developed economies would be able to attract foreign capital with tax discrimination, as shown by related models. Without asserting any conclusions about the efficiency and overall welfare effects of banning tax discrimination, one should recognize that such a measure is not identical to abolishing tax competition for FDI in general. Even if governments are not allowed to discriminate, they may still deviate from their optimal taxation and supply of public inputs in order to attract FDI as long as the residents' income with FDI exceeds their income without foreign investment.

Final remarks concern the place of the theory on competition for FDI within the broader literature. These models show that public policy matters for the location decision of investors, which is also confirmed empirically. It is therefore a large task to include

taxation and public spending aspects in the broader range of models of international trade literature dealing with FDI (see e.g. Markusen 2002, Markusen 2005, Helpman 2006). In addition, since this model considers the competition between countries at different levels of development, it may be considered as a contribution to the general discussion as to why capital does not flow to poor countries. The body of literature dealing with this question is large, the most prominent contribution probably being that of Lucas (1990), but again these studies have mostly neglected the role of fiscal policy, which could have “kept” more capital in the developed world by using subsidies than the neoclassical theory would predict if fiscal policy were neglected.

Appendix 1-A: Explanation for $\pi(G)$, with $\partial\pi/\partial G > 0$ and $\partial^2\pi/\partial G^2 < 0$

The model should reflect the empirical observation that a higher supply of public inputs makes a location more attractive for foreign investor. Since his objective variable is his profit, the natural way to incorporate the mentioned observation in a simple way is to state that his profit is positively related to the supply of public inputs.

If foreign company is a price taker in the global market, and it is assumed that public inputs lower its marginal costs at a diminishing rate (as in Walz and Wellisch 1996), this simply leads to higher profit for the foreign investor induced by higher public inputs supply, with diminishing positive effect as the supply of public inputs increases.

If, however, there is some strategic interaction in the global market, things get more complicated. For the case of duopoly with competition in quantities, the following can be stated, partly following Walz and Wellisch (1996):

The starting point is the following inverse demand function:

$$p_i = a - b(x_A + x_B), \quad i = A, B, \quad a, b > 0. \quad (\text{A1})$$

Thus, there are two companies, A and B, located in different countries and competing on the global market. x_i denotes quantities and p_i is the price. Their profit function is:

$$\pi_i = (a - b(x_A + x_B) - c_i(G_i))x_i. \quad (\text{A2})$$

Marginal costs of firm A (denoted by c_A) are assumed to be reduced with higher public inputs supply, but at a diminishing rate, i.e.:

$$\frac{\partial c_A}{\partial G} < 0 \quad \text{and} \quad \frac{\partial^2 c_A}{\partial G^2} > 0. \quad (\text{A3})$$

In the following it is assumed that the marginal cost of the competitor (firm B) is fixed at c_B . Setting the first derivative of firms' profit functions with respect to $x_{A,B}$ equal to zero yields:

$$x_A = \frac{a - c_A(G) - bx_B}{2b} \text{ and } x_B = \frac{a - c_B - bx_A}{2b}. \quad (\text{A4})$$

This leads to optimal quantities:

$$x_A = \frac{a - 2c_A(G) + c_B}{3b} \text{ and } x_B = \frac{a - 2c_B + c_A(G)}{3b}. \quad (\text{A5})$$

Plugging the above expressions for optimal quantities in the profit function of firm A yields:

$$\pi_A = (a - b \frac{2a - c_A(G) - c_B}{3b} - c_A(G)) \frac{a - 2c_A(G) + c_B}{3b}. \quad (\text{A6})$$

Differentiating the above expression with respect to G yields:

$$\frac{\partial \pi_A}{\partial G} = (-\frac{4}{9b} \frac{\partial c_A}{\partial G})(a - 2c_A + c_B). \quad (\text{A7})$$

Setting the above expression higher than zero yields following condition for a positive relationship between public inputs supply and a firm's profit, i.e.:

$$\frac{\partial \pi_A}{\partial G} > 0 \text{ if } c_A(G) < \frac{a + c_B}{2}. \quad (\text{A8})$$

In addition, differentiating the profit function with respect to G twice yields:

$$\frac{\partial^2 \pi_A}{\partial G^2} = \frac{4}{9b} (\frac{\partial^2 c_A}{\partial G^2} (2c_A - c_B - a) + 2 \frac{\partial c_A}{\partial G}). \quad (\text{A9})$$

This expression is negative i.e. $\partial^2 \pi / \partial G^2 < 0$, if the expression in the brackets is negative. Since the expression in the smaller brackets is always negative in order for condition (A8) to hold, and it is assumed that $\partial^2 c_A / \partial G^2 > 0$, the whole expression must be negative under condition (A8). Thus, under that condition, the profit function of the foreign investor has the postulated properties that $\partial \pi / \partial G > 0$ and $\partial^2 \pi / \partial G^2 < 0$ even with imperfect competition in global markets.

Appendix 1-B: Simulations

The starting point is the following form of domestic firms' production function:

$$F(K, L, G) = G^\gamma \min(K, L) \text{ with } 0 < \gamma < 1, \text{ or } F(K, L, G) = G^\gamma K \quad (\text{B1})$$

since $K < L$. The first derivative of domestic firms' output function with respect to G equals to:

$$\partial F / \partial G = \gamma G^{\gamma-1} K. \quad (\text{B2})$$

The dependency of the foreign investor's profit on public inputs is given with:

$$\pi(G) = G^\delta, \text{ with } 0 < \delta < 1. \quad (\text{B3})$$

The first derivative of the above expression with respect to G is:

$$\partial \pi / \partial G = \delta G^{\delta-1}. \quad (\text{B4})$$

It follows that:

$$\bar{G} = (\gamma K)^{1/(1-\gamma)}, \quad (\text{B5})$$

$$G^* = \left(\delta \frac{K + K^m}{K^m} \right)^{1/(1-\delta)}. \quad (\text{B6})$$

The profit of the foreign investor at the relevant points and tax rates is equal to:

$$\pi(\bar{G}) = (\gamma K)^{\delta/(1-\gamma)}, \quad (\text{B7})$$

$$\pi(G^*) = \left(\delta \frac{K + K^m}{K^m} \right)^{\delta/(1-\delta)}, \quad (\text{B8})$$

$$T^* = \frac{G^*}{K + K^m} = \left(\frac{\delta}{K^m} \right)^{1/(1-\delta)} (K + K^m)^{\delta/(1-\delta)}. \quad (\text{B9})$$

In the next step, the following expressions are defined:

$$X = \pi(\overline{G}_H) - \pi(\overline{G}_U) \text{ and } Y = (\pi(G_H^*) - \pi(G_U^*)) - (T_H^* K^m - T_U^* K^m). \quad (\text{B10})$$

It is of interest to see for which values of parameters it holds that $X > Y$. Let $K_U = K$ and $K_H = zK$, with $z > 1$. Simulations are carried out for different values of: K^m , z , γ and δ . It should be noted that the attainability of G_U^* and G_H^* can easily be ensured because L^m and w are exogenous and do not affect the results of the simulations.

In what follows, the values of δ are calculated for which $X > Y$, i.e. for which the chances of the less developed country obtaining the FDI are increased due to the inclusion of public inputs as an important location determinant in the model. It should be noted that γ and δ can be interpreted as the responsiveness of domestic firms' output, and of foreign investor's profit to changes in supply of public inputs.

The critical values of δ for which $X > Y$ are calculated for all the combinations of the following parameters: $K = 100$; $z \in \{1.1, 2, 10\}$; $\gamma \in [0.1, 0.2, \dots, 0.9]$; $K^m \in \{1, 10, 50\}$.

Table 1-B1: Results of simulations (for $\gamma \in \{0.1, 0.4, 0.7\}$)

z	γ	$K^m = 1$	$K^m = 10$	$K^m = 50$
1.1	0.1	$\delta \in (0.01, 0.15)$	$\delta \in (0.01, 0.45)$	$\delta \in (0.01, 0.74)$
	0.4	$\delta \in (0.01, 0.46)$	$\delta \in (0.01, 0.70)$	$\delta \in (0.01, 0.86)$
	0.7	$\delta \in (0.01, 0.72)$	$\delta \in (0.01, 0.85)$	$\delta \in (0.01, 0.93)$
2	0.1	$\delta \in (0.01, 0.15)$	$\delta \in (0.01, 0.43)$	$\delta \in (0.01, 0.70)$
	0.4	$\delta \in (0.01, 0.46)$	$\delta \in (0.01, 0.68)$	$\delta \in (0.01, 0.84)$
	0.7	$\delta \in (0.01, 0.72)$	$\delta \in (0.01, 0.84)$	$\delta \in (0.01, 0.92)$
10	0.1	$\delta \in (0.01, 0.15)$	$\delta \in (0.01, 0.38)$	$\delta \in (0.01, 0.59)$
	0.4	$\delta \in (0.01, 0.45)$	$\delta \in (0.01, 0.63)$	$\delta \in (0.01, 0.76)$
	0.7	$\delta \in (0.01, 0.72)$	$\delta \in (0.01, 0.81)$	$\delta \in (0.01, 0.87)$

For each combination of parameters, the minimal value of δ is always equal to 0.01. However, the maximal value of δ strongly depends on the values of γ , but also on other parameters. It is always higher than γ but may not be too high. Also, its value increases with the increasing amount of foreign capital K^m , but falls (slightly) with an increasing difference in capital availability in domestic companies in the competing countries, i.e. with higher values of z . The overall conclusion is that the less developed country has better chances of attracting the FDI if the responsiveness of the foreign investor's profit to changes in supply of public inputs is not too high relative to the responsiveness of domestic companies. Also, its chances increase (in the sense that maximal value of δ is higher) if it does not lag too far behind the more developed country in terms of domestic capital availability and when foreign investment is relatively large.

Appendix 1-C: Complete solution of the maximization problem in competition for FDI with tax discrimination

If the government is allowed to discriminate in taxation between domestic and foreign companies, its general maximization problem is:

$$\max_{T, T^m} W = F(K, L, G) - KT + L^m w, \quad (C1)$$

such that

$$G = KT + K^m T^m, \quad (C2)$$

$$\Pi \geq \tilde{\Pi}, \quad (C3)$$

$$W \geq \bar{W}, \quad (C4)$$

$$KT + K^m T^m \geq 0. \quad (C5)$$

The above problem can be solved using the Kuhn-Tucker theorem in which following function is defined:

$$L = F(K, L, G) - KT + L^m w + \lambda_1(\Pi - \tilde{\Pi}) + \lambda_2(W - \bar{W}) + \lambda_3(KT + K^m T^m). \quad (C6)$$

The equality constraint (C2) is plugged into function (C6). One obtains the following first-order conditions:

$$\frac{\partial L}{\partial T} = \frac{\partial F}{\partial G} K - K + \lambda_1 \frac{\partial \pi}{\partial G} K + \lambda_2 \left(\frac{\partial F}{\partial G} K - K \right) + \lambda_3 K = 0, \quad (C7)$$

$$\frac{\partial L}{\partial T^m} = \frac{\partial F}{\partial G} K^m + \lambda_1 \left(\frac{\partial \pi}{\partial G} K^m - K^m \right) + \lambda_2 \frac{\partial F}{\partial G} K^m + \lambda_3 K^m = 0, \quad (C8)$$

$$\frac{\partial L}{\partial \lambda_1} = \pi(G) - K^m T^m - L^m w - \tilde{\Pi} \geq 0, \quad \lambda_1 \geq 0, \quad \lambda_1 \frac{\partial L}{\partial \lambda_1} = 0, \quad (C9)$$

$$\frac{\partial L}{\partial \lambda_2} = W - \bar{W} \geq 0, \quad \lambda_2 \geq 0, \quad \lambda_2 \frac{\partial L}{\partial \lambda_2} = 0, \quad (C10)$$

$$\frac{\partial L}{\partial \lambda_3} = KT + K^m T^m \geq 0, \quad \lambda_3 \geq 0, \quad \lambda_3 \frac{\partial L}{\partial \lambda_3} = 0. \quad (C11)$$

There are eight possible combinations of solutions regarding the effectiveness of constraints (C3-C5).

CASE 1: $\lambda_1, \lambda_2, \lambda_3 > 0$

(C11) reduces to $KT = -K^m T^m$ implying $G = 0$. (C10) becomes $-KT + L^m w = \bar{W} > 0$, and (C9) reduces to $-K^m T^m - L^m w = \tilde{\Pi} \geq 0$ i.e. $KT - L^m w = \tilde{\Pi} \geq 0$. It can easily be seen that the new system of equations has no solution, and therefore $\lambda_1, \lambda_2, \lambda_3 > 0$ can never hold.

CASE 2: $\lambda_3 > 0, \lambda_1, \lambda_2 = 0$, *CASE 3:* $\lambda_1, \lambda_3 > 0, \lambda_2 = 0$ and *CASE 4:* $\lambda_2, \lambda_3 > 0, \lambda_1 = 0$.

In all of these cases (C11) reduces to $KT = -K^m T^m$, and in a way similar to that of CASE 1, it can be shown that there are no solutions in either of these cases. Therefore, constraint (C5) can never be binding and λ_3 is always equal to zero and disappears in all the expressions for the following cases 5 to 8.

CASE 5: $\lambda_1, \lambda_2, \lambda_3 = 0$.

Condition (C7) yields $\partial F / \partial G = 1$ and (C8) reduces to $\partial F / \partial G = 0$. Thus, there are no solutions in case 5.

CASE 6: $\lambda_1 > 0, \lambda_2, \lambda_3 = 0$.

Rearranging (C7) yields:

$$\lambda_1 = \left(1 - \frac{\partial F}{\partial G}\right) / \frac{\partial \pi}{\partial G}. \quad (C12)$$

Substituting the above expression for λ_1 in (C8) yields:

$$\frac{\partial \pi}{\partial G} = 1 - \frac{\partial F}{\partial G}. \quad (\text{C13})$$

This condition defines a unique optimal supply of public goods denoted with \hat{G} .

CASE 7: $\lambda_1, \lambda_2 > 0, \lambda_3 = 0$.

In this case, rearranging (C7) yields:

$$\lambda_2 = \left(\frac{\partial F}{\partial G} - 1 + \lambda_1 \frac{\partial \pi}{\partial G} \right) / \left(1 - \frac{\partial F}{\partial G} \right). \quad (\text{C14})$$

Substituting the above expression in (C8), yields again the condition (C13). Thus, \hat{G} is the unique optimal supply of public goods.

CASE 8: $\lambda_2 > 0, \lambda_1, \lambda_3 = 0$

In this case (C7) and (C8) both lead to $\lambda_2 = -1$, meaning that there are no solutions.

Chapter 2:

Foreign Direct Investment and Export Performance of the Transition Countries in Central and Eastern Europe

Abstract

The purpose of this paper is to investigate whether the inward foreign direct investment (FDI) in 14 transition economies of Central and Eastern Europe, over the period between 1993 and 2001, has improved the export performance of the host countries. It is well known that besides the direct effects of FDI on export performance, i.e. the exports of subsidiaries of multinationals, there are also potential indirect effects of FDI on the host economy and thus possibly on exports, for example through technology transfers and knowledge spillovers. There has previously been no study of these countries at the aggregate, macroeconomic level to encompass the overall, direct and indirect effects of FDI on exports at the same time. The results suggest that, along with real effective exchange rates and development on export markets, foreign direct investment has been a significant determinant of export performance for the whole sample as well as for the two subsamples, in various model specifications.

2.1 Introduction

The question that this paper tries to answer is whether foreign direct investment (FDI) in 14 transition countries of Central and Eastern Europe (CEE), over the period between 1993 and 2001, has improved the export performance of the host economies.²⁵

²⁵ The definition of FDI used in this paper is that of the IMF. FDI is "... international investment in which a resident entity in one economy (the direct investor) acquires a lasting interest in another economy (the direct investment enterprise)" (IMF, 1996). A lasting interest is implied if 10% or more of the ordinary shares or voting power is acquired by the investor. Only trade and exports of goods is considered in this paper (as in most of the related literature), while trade in services is omitted. On the other hand, total FDI, i.e. FDI in all sectors of the host economy is relevant. The countries in the sample are: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia FYR, Poland, Romania, Russian Federation, Slovakia, Slovenia and Ukraine. This choice has to a great extent been determined by the availability of data. Two terms are used to refer to this group of countries: transition countries or the countries of Central and Eastern Europe (CEEC).

Despite the persistent heterogeneity within the region with respect to GDP per capita levels and reforms that have been implemented, the majority of CEE countries have achieved reasonable macroeconomic stability and positive (average) GDP growth rates since the mid- and late 1990s. The most important task for their economic policies now is to facilitate the process of catching up with the richer countries of the European Union. Economic theory and the experiences of more developed countries provide some general policy guidelines for promoting long term growth. They (policy guidelines) have already been put into practice to some extent by the transition countries, and the most important of these practices constitute the essence of the transition process. In addition to the leading role accorded to the private sector, free markets and prices, other important policy aspects include creation of an appropriate institutional and legal framework that encourages entrepreneurship, the promotion and maintenance of competition, and the provision of educational services and infrastructure. In this respect, the liberalization of the external sector is also considered important, and has been implemented to a greater or lesser extent in the great majority of transition economies.

Specifically, strong export orientation can be a powerful engine of economic growth as demonstrated by some East Asian economies in the second half of the 20th century or Ireland over the last two decades. Medina-Smith (2001) gives an extensive overview of the export-growth nexus literature before making an empirical investigation in the case of Costa Rica. Although he finds evidence in favor of the export led growth hypothesis in this particular case, from the literature review he concludes that empirical evidence on the positive relationship between exports and growth may not always be very robust. Still, the majority of the reviewed studies report that exports can be considered to be a significant “engine of growth”, though only with a relatively weak impact. Nevertheless, at the absolute minimum, this link can at least be regarded as a potential one. Moreover, some more recent studies report a mostly positive and significant impact of exports on growth for different countries and country groups and various econometric approaches (see for example Balaguer and Cantavella 2004; Cuaresma and Wörz 2005; Dritsaki and Adamopoulos 2003 for positive evidence on export-led growth hypotheses and e.g. Beko 2003; and Alam 2003 for different results). Policy makers, in particular, attach very high value to export promotion and expect gains in various forms: gains in employment, income and efficiency, increased foreign exchange earnings, economies of scale etc. (UNCTAD 2002, p.117). In addition, countries in CEE, with few exceptions, have mostly been

running current account and especially trade in goods deficits over the last decade or so (the average trade in goods deficit for the countries in our sample over the period considered amounts to 7.52% of GDP), adding to the priority of export promotion as one of the important tasks for national economic policies.²⁶

Although the global as well as country specific circumstances are very different for the countries in Central and Eastern Europe, there are at least some positive lessons from the Asian and Irish experiences about what should be done in order to improve export performance (Kokko 2002). One of them is that foreign direct investment may help in promoting exports. This export-promoting strategy becomes relatively more important due to the narrowed choice of other export promoting instruments as a consequence of international trade agreements, or because some of them have been shown to be ineffective in many cases.²⁷ This is especially important for those CEE countries whose goal is to join the EU and which are therefore, or are about to become, subject to even more restrictive regulations. One could say that it might be easier to attract an exporter, than to create one.

Basically, there are two ways in which FDI inflows, i.e. an increase in FDI stock, may be export-promoting: either directly, through exports of the multinational's subsidiaries, or indirectly, by affecting domestically-owned firms in a number of ways, such as managerial or technological knowledge spillovers or integration of domestic companies into supply chains of the parent firm, and thus increasing the overall international competitiveness of the host economy.²⁸ The potential significance of this link is not in question. The UNCTAD World Investment Report from 2002, devoted to exploring the relationship between transnational corporations and export competitiveness is only a part of the growing literature dealing with this issue. But the actual effects of FDI on the host economy and possibly on its exports depend on the type of the investment as well as on the specific host-country initial economic conditions. In order to check whether FDI has affected the export performance of the CEE countries, pooled data relating to the period between 1993 and 2001 for 14 countries are used. This study will consider both kinds of

²⁶ At the same time, these deficits have largely been financed by the significant FDI inflows into the region (on average, 3.49% of GDP for the sample and time period considered).

²⁷ For example, direct export subsidies to specific industries for some East Asian countries did not contribute to export promotion. Moreover, they have caused many different problems for economic policy (Kokko 2002).

²⁸ To state it clearly once again: although only the exports of goods are analyzed in this paper, the total amount of foreign investment (also the FDI in sector of services) is included because of the possible indirect effects.

effect, direct and indirect, of FDI on host economy exports by performing an overall macroeconomic investigation.

The rest of the chapter is organized as follows. The following section gives a short review of the relevant theory. In section 2.3, the empirical findings from earlier studies about the relationship between FDI and exports are briefly presented, with more attention being given to the available studies exploring this relationship in the CEE economies. This is followed by the presentation and analysis of data on FDI in transition countries and its determinants in order to get some insight into the nature of these capital movements. In section 2.5, an empirical model is given and discussed and summary statistics for other variables are presented. The results of the estimation are presented in section 2.6, while some concluding remarks are given in the last section.

The following chapter of the dissertation then investigates the same potential link between inward FDI and exports for Croatian manufacturing industry using sectoral data and a somewhat different empirical model. Thus, the overview of theory as well as of related empirical studies given below is relevant for that chapter as well.

2.2 Theoretical considerations

The relevant theory can be divided into standard international trade theory on factor movements and trade in goods and theory of multinational enterprise. These two strains of the literature come close to each other in some recent theoretical contributions. In addition, the closing part of this section is devoted to a closer review of the possible channels through which foreign producers can indirectly influence the host economy's export performance. Only some of these indirect channels are described within the formal framework, while others are intuitive.

2.2.1 Standard international trade theory

One of the important questions posed by international trade theory is whether international factor movements and international trade in goods are substitutes or complements.

In a standard Heckscher-Ohlin-Samuelson model (H-O-S), factor prices will equalize even if there is only trade in goods and no factor movements at all. This result is known as the factor price equalization theorem and is due to Samuelson (1948, 1949). In a world composed of two countries, two factors of production and two goods, if the countries face the same relative prices of goods, which will be the case if the goods are traded internationally, then they will face the same factor prices (i.e. returns) and there will be no reason for factors to move.²⁹ In a way, countries would be trading the factors of production indirectly – embodied in the traded goods. In this case trade and factor movements are substitutes. This would also be true if only factors were mobile, and if there were no trade in goods as first shown by Mundell (1957). Then there would still be a tendency for equalization of the commodity prices. The reason for this is that in the H-O-S model, trade arises because of the differences in factor endowments between the countries. Consider a country which is capital-scarce and labor-abundant, the price of capital thus being higher than the price of labor, i.e. wages. This country would then be a net exporter of the labor intensive good. If the situation with the endowments of another country were exactly the opposite, this country would export the capital intensive good. Now, if there were no trade in goods, and if capital were mobile, it would move to the capital-scarce country because of the higher price of capital. This would go on until the prices of capital were equal in both countries, meaning that the capital-labor ratios too were equalized. But in this case the countries' relative factor endowments and the relative prices of goods would be the same and there would be no reason for trade in goods. Thus, factor movements and international trade are substitutes.

Subsequent research has shown that if additional assumptions are included into the standard models, it is possible for factor movements and international trade to become complements. Different ways of achieving this result include, e.g., allowing for differences in technologies and preferences across countries, introducing production taxes, monopoly market structure, external economies of scale etc. (see Goldberg and Klein 2000 for an overview of relevant research). The reason is that in these cases differences in factor endowments are not a (at least not the only) cause of trade. A very simple example is the Ricardian model in which countries have different technologies. Under the assumption of equal labor productivities and different productivities of capital, a country with higher capital productivity will export the capital-intensive good and import the labor-intensive

²⁹ Without factor intensity reversals.

good. If capital is internationally mobile, it will move to the country with high capital productivity, where it earns higher returns. Thus, through the Rybczynski effect, it will contribute to higher production and exports of the capital-intensive good and more imports of the labor-intensive good. In such a model, factor movements and trade are complementary.

2.2.2 Theory of multinational enterprise

The central idea of the theory of multinational enterprise is that firms must have certain advantages in order to become multinational companies. It is reasonable to expect that firms can do business in foreign countries only at a higher cost than domestic firms. Without specific advantages capable of compensating for this inferior position, their foreign operations would not be sustainable. In his OLI paradigm Dunning (1993) organized these advantages in three basic groups. In his opinion the multinational firm has a product or a production process giving it some monopoly power in the foreign market (ownership advantage - O), has a reason to locate production abroad (location advantage - L), and has an incentive to exploit its ownership advantage internally (internalization advantage - I). A direct conclusion is that firms may have different motives for becoming multinational enterprises. These motives may define different types of foreign direct investment, which on the other hand, may have different impact on the home and, for this research more interesting, host country's economy, and thus, export performance.

The impact of the various types of FDI on a host country's exports as suggested by the OLI paradigm is summarized in Table 2.1.

Table 2.1: Expected trade effects from different types of FDI in the host country perspective³⁰

MOTIVE	TRADE EFFECTS	
	Imports	Exports
Market-seeking	Increasing	None
Resource-seeking	None	Increasing
Strategic Asset-seeking	Ambiguous	Ambiguous

Source: Jensen 2002, p. 208, modified.

³⁰ Resource-seeking investments include both natural resource- and labor-seeking investments, while strategic asset-seeking investments involve acquisition of the local firms.

It is difficult, if not impossible, to predict the macroeconomic effect of FDI on exports, unless one knows that most foreign investment is either market- or resource-seeking. But even if one knew that most of the FDI in some host economy were e.g. market-seeking, there still might be some positive effects of FDI on exports through different channels of indirect influence.

In the beginning of the 1980s the first steps were made to incorporate the concept of the multinational enterprise (MNE) into the standard theory of international trade (see Helpman and Krugman 1985; Markusen 2002).³¹ Over the last few years, there have been substantial advances in this part of international trade literature and some additional aspects of the theory of multinational enterprise have been included and formalized. In these recent models, the results on the relationship between factor i.e. capital movements (FDI) and trade depend on whether the multinational firms are horizontally (the MNE produces the same product in multiple plants located in more than one country) or vertically integrated (segments of the production process are carried out in different countries).³² The type of integration is determined by factors such as transport costs or firm- and plant-level economies of scale. The results can be summarized as follows: Horizontally integrated firms often arise because of trade barriers in the form of tariffs (“tariff jumping investment”), or high transport costs. The firm basically faces the dilemma of either exporting to host country or setting up a plant in the host country and supplying the local market from this location. Such foreign investments and trade are substitutes. FDI is favored relative to exports if the foreign market is large, transport and tariff costs are high, firm-level economies of scale are large compared to plant-level economies of scale, if the countries are similar in size and relative endowments and as the world income grows (Markusen 2002, p. 103; Markusen and Venables 1998). Things are different in the analysis of vertically integrated MNEs, which includes trade in intermediary products. The production process is likely to be geographically fragmented if the countries have factor-price differences and the stages of production have different factor intensities. Since segments of the production process occur in different countries, intermediate products need

³¹ This part mostly follows a detailed overview of theory of MNE in Markusen (2002). Some of the important original studies include Horstmann and Markusen (1992), Markusen (1995), Markusen and Venables (1998, 2000), Zhang and Markusen (1999) and Ekholm et al. (2003).

³² Since in reality MNEs have very complex strategies, this distinction is more important in analytical terms than in practice (Helpman 2006).

to be traded, with the consequence that this kind of investment is likely to be encouraged by lower trade costs. For this kind of FDI, resulting in a vertically integrated firm, complementarity between FDI and trade is more likely if the host country is large and differences in endowments are small (Markusen 2002, p. 207). In such cases the MNE typically ships (part of) its production in the host country back to the home country thus increasing host country exports (Markusen 2002, p. 189). It should be noted that when differences in endowments become very large, i.e. one (developing) country lacks some required input, it receives no FDI at all (Zhang and Markusen 1999).

There is another specific type of model of multinational enterprise, which incorporates some features that can motivate both horizontally and vertically integrated multinational firms (Markusen 2002, p. 129). The defining assumptions of this “knowledge-capital model” are that there are knowledge-based assets (headquarters), which are skilled labor-intensive and may be geographically separated from production, possibly motivating vertical integration. The services of knowledge-based assets are (at least partly) joint inputs into multiple production facilities – a property that gives rise to horizontal multinationals. In such a model, trade and investment are complements, in the sense that liberalizing capital movements may increase the volume of trade, if the differences in countries’ relative endowments and sizes are large. On the other hand, if the countries are similar and trade costs are not low, FDI and trade are substitutes.

The majority of models in the theory of MNE investigate the relationship between FDI and trade flows between home and host countries. However, in reality, a foreign subsidiary of MNE will often be used for supplying the markets of third countries as well, especially those to which it is cheaper and easier to export from the host country plant rather than from the home country plant. For example, an US MNE may set up a plant in e.g. Hungary and supply all the Central European markets from this production site, which then increases Hungarian exports (to third countries). In the context of this paper (impact of inward FDI on host country exports), such situations are more important than e.g. some cases of horizontally integrated MNEs in which a company chooses between exporting from home country to host country and building the plant in the host country to supply the local market.

The possibility that foreign subsidiary in the host country does not have to sell its product only locally (or in the home country) is developed in the theoretical work by Ekholm et al. (2003). They use a three-countries model, in which one country is small but with low production (assembly) costs (and with no local demand), unlike the other two identical, large and high cost economies. In their model, there is a possibility of both vertical and horizontal integration of MNE, depending on trade and production costs. One firm in each of the two high cost countries produces intermediate goods, which may be assembled at home, but in any other country as well. They analyze situations with symmetric and asymmetric trade costs between the small and the two large countries. In a symmetric case, with moderate trade costs and sufficient production-cost advantage of the small country, the latter is used as an export platform by both firms to serve the other large high-cost country's market. If trade costs are lowered and the production-costs advantage of the small country is increased, then single plants of both firms are located in the small country and all the markets are supplied from this location. If trade costs are asymmetric (a free trade agreement between one large country and the small country), the firm from the outside large country may build a plant within the free trade area to supply the foreign market and will choose the small country because of the smaller production costs. When production costs are sufficiently low, it may supply the whole market from this location. Similarly, the firm from the large country within the free trade area may set up a plant in the small country and supply the whole market from this location. The most important implication is that, within this model, there may be a direct positive effect on host country exports to countries other than the home country, in settings with vertically and horizontally integrated multinational firms.

Summarizing the findings of the theory of MNE regarding the influence of inward FDI on host country exports, the following can be stated: positive effects on host country exports through inward FDI may be expected in cases where the host country has different factor intensities from the home country. In such situations an MNE may outsource some segments of its production process to the host country and export these (intermediate) products back to the home country (or to other countries as well). This is eased when trade costs for inputs are relatively low. Similarly, when the host country has a sufficient production-cost advantage and relatively low trade costs toward third countries (as compared to the trade costs of the home country toward the same third countries), it may

be used by an MNE as an export platform for serving the home market, as well as other markets, in settings with horizontally or vertically integrated MNE.

2.2.3 Possible channels of indirect influence

The impact of FDI on host country exports is not only direct, through the exports of the foreign affiliates. There are very important side-effects of foreign production, which may influence the export performance of domestic producers indirectly. In this section, some commonly mentioned channels will be briefly described without reference to empirical evidence.

As mentioned above, the companies need to have some competitive assets, which are often firm-specific, in order to become MNEs (ownership advantages). These firm-specific competitive assets, often referred to as MNEs' superior knowledge or technology, are broadly defined and include e.g. production process, innovative products, human capital, wide distribution networks or patents (Markusen 2002, p. 18, Girma et al. 2007). As noted by Girma et al. (2007) these advantages are then reflected in high productivity of MNEs as compared to other firms.³³ It is especially difficult for local producers in less developed economies to acquire such assets and capabilities by themselves. But a transfer of these assets to foreign affiliates in the host economies by MNEs "... through training, skills development and knowledge transfers opens up prospects for further dissemination to other enterprises and the economy at large" (UNCTAD 2002, p.152). This upgrading of technical and managerial skills, provided by the multinationals may *spill over to domestic producers* (for example, through mobility of trained human resources), enhancing their productivity and helping them to improve their competitiveness on export markets. Under the assumption that the foreign affiliates produce more efficiently (which is mostly the case, see footnote 33), locally owned firms might increase their efficiency by copying the operations of the foreign producers. If such demonstration effects arise inside the MNE industry they are often referred to as *intra-industry spillovers or horizontal effects*. However, MNEs may also affect domestic companies in other sectors (*spillovers to forwardly and backwardly linked industries*). In the specific context of exporting domestic

³³ Helpman et al. (2004), note that MNEs have higher productivity than other companies, including exporters, which, on the other hand, tend to be more productive than non-exporters. A theoretical model by Melitz (2003) yields predictions that are in accordance with these observations.

companies, MNEs may also facilitate access to foreign markets for the domestic producers, by processing information about their home economies, or by lobbying for favorable treatment of exports from the host economy in their home countries (UNCTAD 2002, p. 152).

Another horizontal effect is that domestic companies may be forced to increase their efficiency by the foreign competition (Lipsev 2002). The latter effect is often referred to as *competition effect* and it has been analyzed formally by Markusen and Venables (1999) and Barrios et al. (2005). In both of these papers, the entry of an MNE in one sector of the host economy increases competition, which may force some domestic companies to leave the market. Thus, the competition effect is negative (at least initially), though it is probably less pronounced in the case of export-oriented MNEs and/or domestic companies (Barrios et al. 2005).³⁴

However, MNE entry may change the supply and demand conditions in other, related sectors of the host economy (Markusen and Venables 1999). For example, an additional channel for productivity spillovers is the *forward linkages* that occur when foreign affiliates sell goods or services to domestic firms. Improved products and services (and/or lower prices) in the downstream sector of a domestic firm (incurred through more intense competition due to an MNE entry in that sector, or because of higher quality of inputs produced by foreign producer) may improve the domestic firm's own productivity and competitiveness as well. This implies that also FDI into a non-exporting sector may contribute to improved performance of domestic exporters.

Another type of linkage between foreign and domestic producers consists of *backward linkages* to suppliers.³⁵ If the presence of a foreign producer creates additional demand for

³⁴ The analyses by Markusen and Venables (1999) and Barrios et al. (2005) are not carried out in the specific context of exporting domestic companies. However, they may easily be interpreted in this context: It may be enough that an exporting domestic company loses market share at home or abroad as a result of a FDI from its competitors. As a consequence, it may be forced to produce at the higher average costs which may endanger its competitiveness and market share at the export markets as well and further increase the average costs of production. Thus, in the case of export-oriented companies the inward FDI may have negative consequences for host country's exports if the (potential) loss of exports by domestic companies is not compensated for by new exports of the MNE's local affiliate.

³⁵ Defined broadly, linkages can also be established to institutions such as universities, training centers and export promotion agencies (UNCTAD 2001, p.127).

local inputs, the supply industries may be strengthened.³⁶ Markusen and Venables (1999), show (though not in the context of exporters) that strengthening the supply industries may benefit the domestic producers in the MNE's industry, through the mechanism of forward linkages described above, and that this positive side-effect can be stronger than the competition effect in the MNE's sector. Similarly, Barrios et al. (2005) show that despite the initial negative competition effect of an MNE's entry, the indirect positive effect may prevail when the number of foreign firms is sufficiently high.

Through all of the above channels, FDI affects the factor productivities and thus, comparative advantages of host economies. Such a change inevitably influences the size, structure and direction of international trade. Therefore, FDI and trade become inseparable as "... two sides of the coin of the process of economic globalization." (Sun 2001).

It must be noted that the extent of the spillovers and indirect effects of FDI on exports may depend (at least in some industries) on the initial technological and human capital level of domestic producers (Girma et al. 2007; Barrios et al. 2005), on the intensity of competition in domestic markets, as well as on government policies promoting linkages between domestic and foreign firms (Barry and Bradley 1997). Moreover, there may be other potential negative effects of MNEs on domestic producers, besides the competition effect described above. For example, another potential danger is the neglect of domestic firms by government policies if governments concentrate attention mostly on multinationals (Barry and Bradley 1997). Further examples in which FDI may reduce a host country's exports can be constructed. For example, if the FDI flows into a non-exporting industry of a country in which skilled managers are scarce, and if the MNE involved pays higher wages in order to attract high-quality workers (which, according to Lipsey 2002, is often the case), then it is possible that the output of the exporting sector will be reduced due to the lack of skilled managers.³⁷

³⁶ Foreign producers may also demand higher quality of (local) inputs (Lipsey 2002). Also, if domestic suppliers manage to enhance their efficiency and quality of their products, they may also gain access to MNE's intra-firm markets (UNCTAD 2001, p. 129).

³⁷ More generally, this may be considered as a form of a Rybczynski effect. Foreign capital flows into a non-exporting sector, raising the marginal product of labor in that sector. If factors are paid their marginal products, and labor is mobile between sectors, more workers will move to non-exporting industry reducing the output of the exporting sector.

It is difficult, if not impossible, to find empirical evidence on specific types of spillovers through single channels, but there are studies which try to test for the presence of spillovers in general as well as through some specific channels. The results of this line of research will be briefly presented in the next section.

2.3 Previous empirical findings

Since there are many potentially significant indirect influences, an overall macroeconomic investigation of the impact of FDI on exports of the host country seems to be justified. Such an approach is preferable to just analyzing the specific investment projects and asking if they are export-oriented (Lipsey 2002, states that it is generally found that foreign producers are more export-oriented than domestic firms), or looking for evidence of export spillovers only, which then would exclude the direct contribution of the foreign affiliates to the export performance of the host country. Nevertheless, after reviewing some research of the relationship between FDI and trade at the macroeconomic level, also the results of the few interesting studies concentrating more on the direct influence of foreign investments on exports or solely on export spillovers are briefly presented and discussed.

The papers from Sun (2001), Zhang and Song (2000), and from Goldberg and Klein (2000) try to capture both the direct and the indirect effects of FDI on trade at the macroeconomic level, using econometric tools. Sun (2001) looks at the different impact of foreign investment on exports in three regions of China in a period from 1984 to 1997, and thus implicitly takes the specific initial conditions of the individual regions into account. He uses a panel data econometric model and finds that the effects of FDI on export performance vary across the three regions. The impact is positive and the strongest in the coastal region. In the central part of China it is weaker, but still positive and significant, while in the western region it is insignificant. Zhang and Song (2000) address the same research question in China at the provincial level in the period from 1986 to 1997 with a somewhat different empirical specification. Using the panel data model, they also find that higher levels of FDI are consistent with higher provincial exports. It is worth noting that the positive effect of FDI on exports in China has mostly been a direct one. Goldberg and Klein (2000) analyze the impact of FDI from the United States in the manufacturing sectors of individual Latin American countries on the net exports of those and other

sectors. They basically test if the capital movements and trade in goods are substitutes or complements. Thanks to detailed data on bilateral capital and trade flows between the U.S. and host countries in Latin America, they are also able to address the inter-sectoral spillovers in a more explicit way. The results vary across sectors and host countries, reflecting the importance of the specific conditions in individual countries and industries. The fact that the results are mixed makes it impossible for the authors to draw a strong and clear conclusion on substitutability or complementarity of the FDI flows and trade.

Barry and Bradley (1997) concentrate on determining the nature of FDI in Ireland and analyze the effects of FDI on Irish exports in a more descriptive way, concluding that there has been a significant direct contribution of foreign producers to increasing Irish exports because the FDI in Ireland has mostly been export-oriented.³⁸ The authors believe that reducing the almost total dependence on the United Kingdom as a trading partner as a consequence of FDI was especially important. They also mention the possibility of additional indirect influence through spillovers, but no attempt has been taken to show it empirically.

As for the studies on spillovers from foreign to domestic firms, there are simply too many papers on various types of spillovers and different channels for all of them to be presented here. Not only studies on export spillovers but also those on productivity spillovers are important. For this reason this part mostly relies on presenting the results of a recent literature review on FDI spillovers by Görg and Greenaway (2004). Out of 40 studies concerned with intra-industry productivity spillover effects from FDI on domestic firms in developed, developing and transition economies, 19 report statistically significant and positive spillovers, 15 studies do not find any significant effects, while 6 papers find some evidence of negative effects. Interestingly, many studies on FDI spillovers in transition countries find some evidence of negative spillovers. The evidence of positive horizontal, i.e. intra-industry spillovers, is even weaker if one considers some methodological drawbacks such as potential bias of the cross-section estimates used in many of the reviewed studies.³⁹ Görg and Greenaway (2004) also give some possible explanations for

³⁸ Ekholm et al. (2003) also note that many of the inward FDI to Ireland are pure export-platform investment.

³⁹ At this point, it is important to mention the “meta analysis” of FDI and productivity spillovers by Görg and Strobl (2001). They investigate whether the study design affects the results and if there is a tendency in academic journals to publish papers with statistically significant results. They conclude that the choice of

these findings. For example, many studies use data with too high a level of aggregation, making the spillover effects much more difficult to detect (which does not mean that they do not exist). In addition, the spillovers may simply depend on some host country characteristics and on the type of FDI prevailing in these countries, leading to different (mixed) results for (different groups of) different countries.

The evidence on positive FDI productivity spillovers on forwardly and backwardly linked industries is somewhat more convincing than for the horizontal effects. The same is true for papers dealing with the export spillovers. Three out of five papers included in the survey by Görg and Greenaway (2004) find positive and significant effects of FDI on domestic firms' exporting activity, while the other two fail to establish any significant relationship. One of the papers they considered is a well-known study on export spillovers by Aitken, Hanson and Harrison (1997). They use panel data on Mexican manufacturing plants for 1986 and 1989, estimate a probit model, and find evidence that the higher export activities of multinational companies increase the probability that a firm in the same sector is an exporter. Using a similar empirical approach and data for Slovenian manufacturing sectors, Kumar and Zajc (2003)⁴⁰ find no evidence of intra-industry export spillover effects, nor do they find significant spillovers to forwardly linked industries from foreign producers to domestic firms. Moreover, their results suggest negative spillover effects from MNEs to backwardly linked industries. This result does not mean that FDI does not contribute to Slovenian exports because the method the authors apply does not consider direct effects. Moreover, it also does not consider the possibilities of some spillover channels such as worker mobility to industries not directly linked to the industry with foreign investment whose impact is being tested.

Two more recent studies of indirect effects of FDI on domestic producers are especially important in the context of this paper: First, Girma et al. (2007) explicitly test the effect of inward FDI on the productivity of exporters in the UK which have been acquired by foreign companies. This is important since much of the FDI inflows in the transition countries happened through the acquisition of the existing companies (mostly through privatization). Their results show that acquisition FDI affects the productivity of acquired

empirical method used, and the definitions of the presence of multinationals affect the results, and that there is some evidence of publication bias.

⁴⁰ This study was not considered by Görg and Greenaway (2004), and is the only paper known to the author of this paper that deals with export spillovers from FDI on domestic firms in transition economies.

firms, but this impact was not equally distributed across the post-acquisition period nor was it even for companies with different productivity levels prior to acquisition. Without controlling for the initial productivity, Girma et al. (2007) find that one year after acquisition, FDI has had significant and positive influence on average productivity growth of acquired companies (no significant effect was found in the year of acquisition). When controlling for pre-acquisition productivity, only the acquired firms with relatively high productivity before acquisition experienced productivity gains in the year of acquisition, reflecting the importance of absorptive capacity for (immediately effective) indirect effects. The companies with lower initial productivity, on the other hand, benefit more from FDI two years after acquisition. The positive effect of FDI on productivity growth of the acquired firms becomes less visible in the third year after acquisition.

The other paper with important empirical findings is by Barrios et al. (2005). They tested their theoretical prediction that, at first, negative competition effect from FDI is stronger, but with more inward FDI, the positive externalities dominate the initial negative effect (the *u-curve* overall effect of FDI on domestic companies). This is empirically confirmed on their sample of Irish companies implying that a sufficient accumulation of foreign capital plays a crucial role for the effectiveness of indirect effects on domestic companies.

In addition to potential indirect effects of FDI on domestic companies' exports described above, FDI can also affect the structure and direction of a host country's exports. As for studies concerning transition countries, Jensen (2002) investigates the impact of FDI on the structure of Polish exports and finds that inward FDI in Poland positively affected the technology intensity of exports. Repkine and Walsh (1998) use foreign direct investment in Bulgaria, Hungary, Poland and Romania to model the growth of EU-oriented output within industries (product categories that were exported to the EU before transition). The growth of this output segment was stronger than the growth of the non-EU-oriented production in all observed countries. The reasons are found to be the use of foreign capital and expertise which enabled easy privatization and restructuring of these industries. Djankov and Hoekman (1996) analyze the changes in the structure and destinations of exports of CEE countries. According to their findings, the Czech and Slovak Republics have experienced the greatest redirection of trade as well as the fastest growth of exports. On the other hand, the change of the composition of exports in these two countries has been relatively slow. In

general, they find that the FDI inflows were strongly correlated with export performance and intra-industry trade levels.

2.4 FDI in CEE – Determinants and nature of FDI inflows and potential impact on exports

There has been a substantial increase in FDI flows into the countries of Central and Eastern Europe since the beginning of the transition process: the share of FDI inward stock in Central and Eastern Europe in the world's total FDI inward stock rose from about 0.2% in 1990 to 2.3% in 2001 (UNCTAD 2002). This development went hand in hand with the global increase of international capital movements: over the same period, the amount of the world's total inward stock of FDI has increased from 1 871 to 6 846 billion USD (at current prices, UNCTAD 2002). Data on percentage of FDI stock in GDP of the individual countries in the sample is given in Table 2.2. Minimum and maximum values are usually, but not always, the values from the beginning and the end of the period covered by the study.

As is obvious from the Table 2.2, there are large differences in the shares of inward FDI stock in GDP across countries in the sample. In Estonia, Czech Republic and Hungary, the maximal values of this percentage have exceeded 45%. Average FDI inflows, as a share of GDP, amounted to more than 5% for each of these three countries. On the other hand, the minimum values of FDI stock to GDP ratio for Hungary and Estonia were larger than the maximal value of the corresponding share of FDI stock in GDP for Russia and Ukraine.⁴¹

⁴¹ While the amount of FDI attracted by Russia was comparatively low, it received portfolio investment (those not exceeding 10% of total equity of the acquired company, (IMF 1996)) in amount far above the CEE average (Garibaldi et al. 2002).

Table 2.2: FDI inflow and stock in CEE countries, in % of GDP, 1993 – 2001

		Mean	Median	Maximum	Minimum	Standard deviation
Bulgaria	Inflow	3.52	4.22	7.95	0.37	2.79
	Stock	11.70	9.15	29.53	1.30	10.62
Croatia	Inflow	3.79	2.74	8.17	0.64	2.88
	Stock	12.02	7.09	33.08	1.10	12.04
Czech Republic	Inflow	5.58	4.93	11.50	1.87	3.68
	Stock	23.74	17.43	47.18	9.78	13.79
Estonia	Inflow	7.19	5.99	11.16	3.45	2.52
	Stock	32.75	24.77	57.01	14.62	16.19
Hungary	Inflow	5.03	4.71	9.97	2.76	2.07
	Stock	32.67	35.17	45.38	14.49	11.04
Latvia	Inflow	5.29	5.74	9.24	2.08	2.31
	Stock	19.89	22.56	30.76	3.45	9.58
Lithuania	Inflow	3.22	3.37	8.61	0.74	2.44
	Stock	12.90	10.86	22.23	5.73	6.60
Poland	Inflow	3.62	3.41	5.93	2.00	1.30
	Stock	11.72	10.13	22.13	2.69	7.24
Romania	Inflow	2.26	2.82	4.86	0.36	1.48
	Stock	8.80	6.94	19.38	0.80	7.27
Russia	Inflow	0.87	0.80	1.71	0.25	0.41
	Stock	4.00	2.66	9.03	0.69	3.33
Slovakia	Inflow	3.36	1.80	10.55	1.04	3.29
	Stock	12.97	9.97	27.28	3.85	8.12
Slovenia	Inflow	1.26	0.97	2.35	0.89	0.56
	Stock	12.16	12.12	17.06	7.53	3.24
Macedonia	Inflow	2.61	0.56	12.91	0.04	4.21
	Stock	5.41	1.49	24.04	0.04	7.79
Ukraine	Inflow	1.28	1.24	2.11	0.42	0.60
	Stock	5.80	3.87	12.15	1.13	4.54

Note: All data sources are defined in the section 2.5.

In order to understand this uneven distribution better, as well as the motives of foreign investors in CEE countries, and thus, the types and possible consequences of FDI inflows on host economies, first the determinants of FDI flows are examined. There are quite a few studies on the determinants of FDI in the transition economies of CEE. One of the recent ones (Garibaldi et al. 2002) finds that good macroeconomic performance and stability, as measured by gross domestic product growth and high fiscal balance, promotes FDI inflows. Also, the level of economic reforms in general, and specifically the liberalization of international trade, encourages foreign investment. It is important to note that Garibaldi

et al. (2002) use the EBRD trade reform index as the measure of trade liberalization. They also find that, as expected, countries rich in natural resources attract more investment. Also, the privatization method plays a significant role, with insider-privatization discouraging FDI inflows. As expected, direct barriers to investment and complicated bureaucracy both have a deterrent effect on FDI inflows. In their specification, wages did not turn out to be a statistically significant determinant of FDI inflows. Using a better measure of labor costs, namely unit labor costs, Bevan and Estrin (2004) find that these are a significant factor for foreign investment, along with host and home market size and proximity. Based on these results, they conclude that FDI flows into transition countries have been both market seeking and efficiency seeking.⁴² In addition, Bevan and Estrin (2004) find that announcements of EU accession for some countries had positive impact on FDI flows into these economies.

Both of the above studies are concerned with aggregate foreign direct investment. But since the focus of this research is on the effects of FDI on exports, it is very important to know the determinants of FDI inflows in manufacturing sectors. Exactly this question was addressed by Resmini (2000). She splits manufacturing into four sectors: scale-intensive, high technology, specialized producers and the traditional sector. While over 80% of the FDI in twelve CEE countries go to scale-intensive and traditional sectors, there are some important differences among individual host economies. After a descriptive analysis, it is shown that the countries most successful in the transition process attracted the most scale-intensive and high technology investments; that proximity to Western Europe seems to be an important factor for FDI; that there is a strong correlation between the transition process, privatization and FDI; and that market size has played an important role. After a panel data econometric investigation with common slope coefficients for all sectors, and without restrictions on intercepts, it is confirmed that market size, country risk indicator and wage differentials were statistically significant determinants of FDI inflows. On the other hand, the size of the manufacturing sector and the degree of openness as measured by the share of bilateral trade with EU in GDP were not found to be significant. After relaxing the assumption of common slope coefficients for all sectors (thus, reducing the number of degrees of freedom and making the estimation less reliable), it is found that the results for scale-intensive sector are very similar to the results obtained earlier, and quite different from the results for the traditional sector. The latter show that openness affects FDI

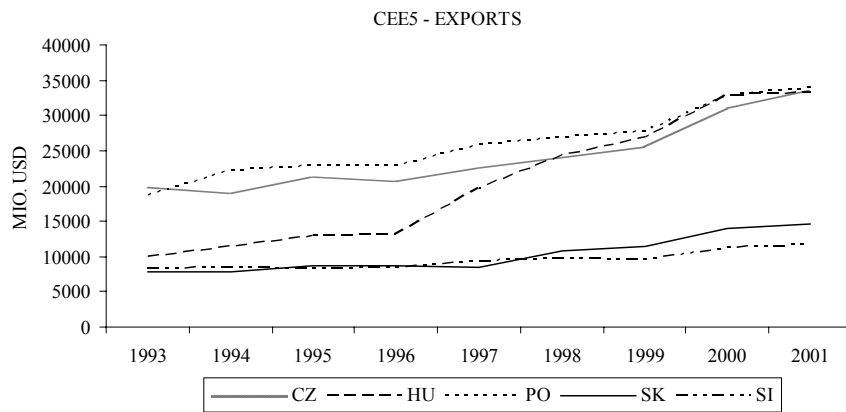
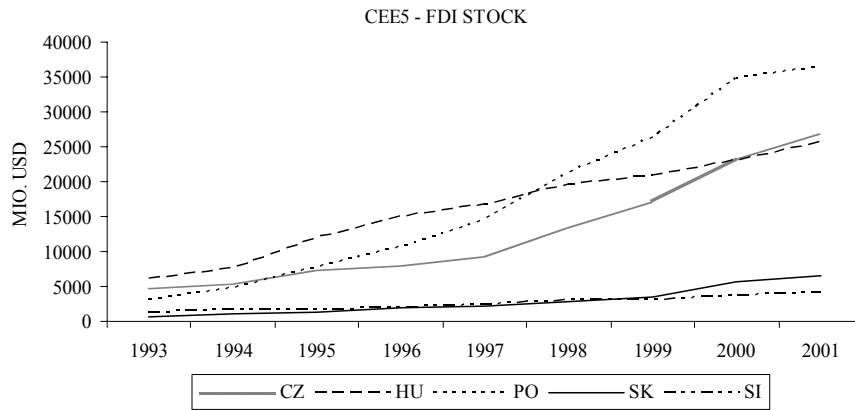
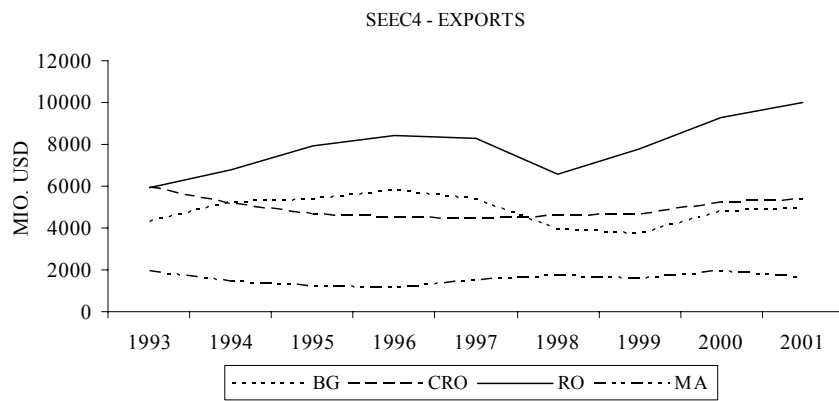
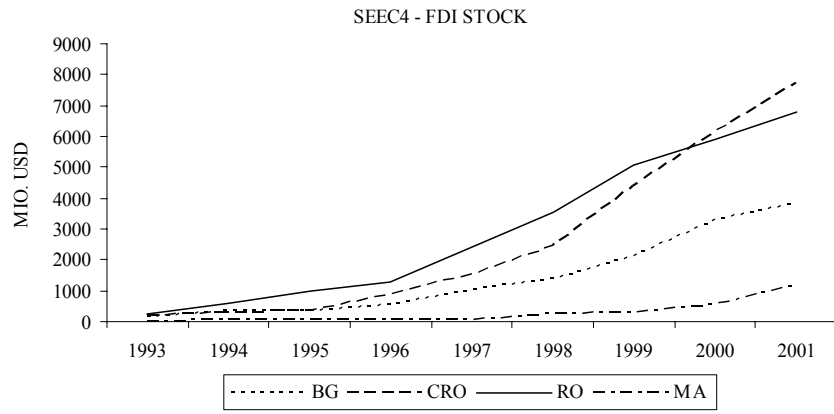
⁴² Their findings are confirmed to large extent in the study by Carstensen and Toubal (2004).

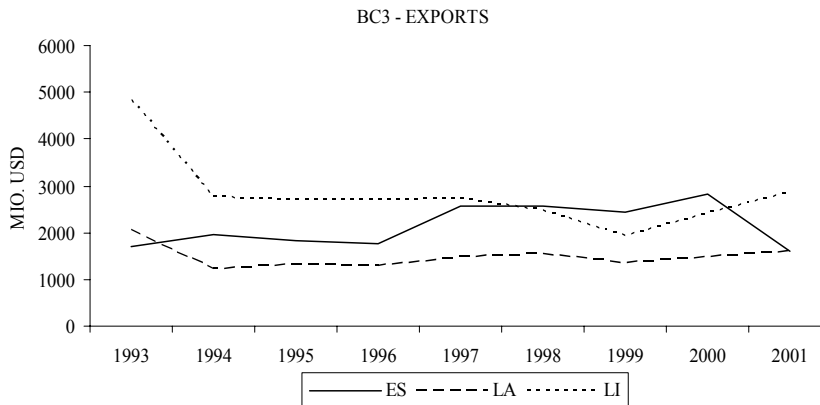
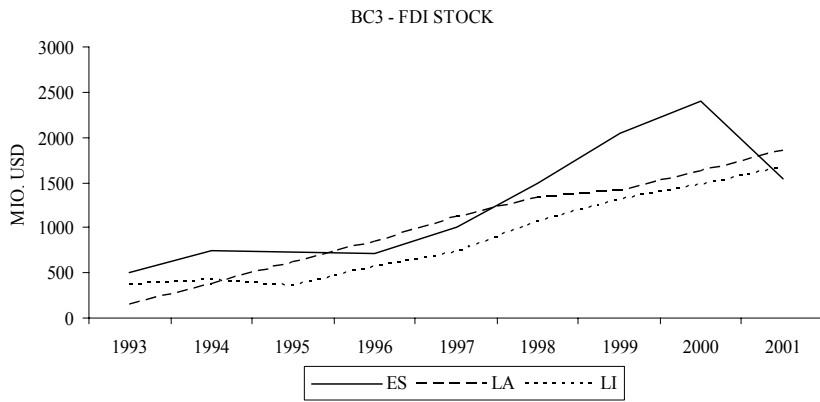
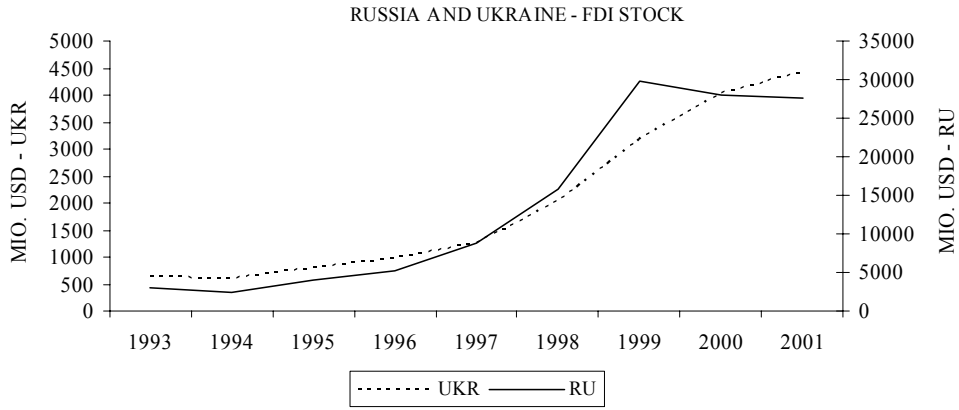
positively but the size of the manufacturing sector and differences in labor costs negatively. At the same time, for the high technology sector, it is found that openness negatively and significantly affects FDI inflows. This and some other unexpected results, which could not be explained, suggest that the findings in the specification without any restrictions on slope coefficients are to be taken with great caution.

Taken all together, the empirical evidence on the determinants of FDI flows in CEE countries reveals a variety of important factors, leading to the conclusion that there have been different motives, and thus types of foreign investment into these countries. In terms of the OLI paradigm, there have been market-seeking, resource-seeking (especially efficiency and labor) and strategic-asset seeking (through privatization) FDI inflows. It is difficult to predict any relationship with exports based on these findings and the theoretical expectations summarized in Table 2.1.

Figure 2.1 shows the development of the FDI inward stock and exports for each of the countries in the sample, divided into four groups, expressed in millions of US dollars, at constant (1995) prices. SEEC4 denotes four South-East European countries (Bulgaria, Croatia, Romania and Macedonia FYR), CEC5 stands for five Central European countries (Czech Republic, Hungary, Poland, Slovakia and Slovenia) and BC3 for three Baltic countries (Estonia, Latvia and Lithuania).

Figure 2.1: FDI stock and exports





It is easy to notice that the amount of FDI stock has almost constantly increased in all countries in the sample, over the period considered. At the same time, exports have mostly been stagnating in all countries except for the five Central European economies. Also, there has been an upward trend in Russian, Ukrainian and Romanian exports for the second half of the observed period.

As for the direct influence of MNEs on exports, UNCTAD (2002) reports the shares of foreign affiliates in the exports of selected host countries. This data is available for only some of the CEE countries and for some years: this share amounted to 26% in Slovenia and 80% in Hungary (data for 1999), 60% in Estonia, 56% in Poland and 21% in Romania (data for 2000).⁴³ There are obviously large differences in the export-orientation of foreign producers in different host economies. It should be noted that these shares do not have to represent “new exports” created by the MNEs. Foreign investors may have acquired a domestic exporting company, without increasing its production for exports. Since it is not possible to judge if FDI has significantly influenced exports from the countries of this region, based on these data and Figure 2.1 only, an empirical model has been specified in order to test that relationship econometrically.

2.5 Model specification and the data

This study concentrates on 14 countries of Central and Eastern Europe over the period between 1993 and 2001. The countries are: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia FYR, Poland, Romania, Russian Federation, Slovakia, Slovenia and Ukraine. This choice has to a great extent been determined by the availability of data. The following specifications of the one way error component panel data model have been used in order to test if there was a significant relationship between foreign investment and export performance:

$$\ln EX_{it} = \alpha_i + \beta_1 \ln FDI_{i(t-1)} + \beta_2 \ln REER_{it} + \beta_3 \ln EM_{it} + \varepsilon_{it} \quad (M1)$$

$$\ln EX_{it} = \alpha_i + \beta_1 \ln FDI_{i(t-1)} + \beta_2 \ln REER_{it} + \beta_3 \ln EM_{it} + \beta_4 \ln I_{i(t-1)} + \varepsilon_{it} \quad (M2)$$

$$\ln EX_{it} = \alpha_i + \beta_1 \ln FDI_{i(t-1)} + \beta_2 \ln REER_{it} + \beta_3 \ln EM_{it} + \dots + \beta_5 \ln \Delta TLI_{it} + \varepsilon_{it} \quad (M3)$$

⁴³ Data for Poland and Estonia include exports of majority-owned foreign affiliates only.

$$\ln EX_{it} = \alpha_i + \beta_1 \ln FDI_{i(t-1)} + \beta_2 \ln REER_{it} + \beta_3 \ln EM_{it} + \beta_4 \ln I_{i(t-1)} + \beta_5 \Delta TLI_{it} + \varepsilon_{it} \quad (M4)$$

The above specifications are combinations and modifications of the models used by Sun (2001), Zhang and Song (2000), and Goldberg and Klein (2000). Subscript i stands for cross section units, i.e. countries ($i=1 \dots 14$), while t denotes time. The variables are denoted as follows: EX stands for exports, FDI for foreign direct investment, $REER$ represents real effective exchange rates, I denotes domestic investment, while ΔTLI stands for the change of trade liberalization index.

The dependant variable is the natural logarithm of exports $\ln EX$ (as in Sun 2001; and Zhang and Song 2000). The first explanatory variable taken is the natural logarithm of the cumulative stock of the foreign direct investments $\ln FDI$ (again following Sun 2001; and Zhang and Song 2000). The theoretical arguments given in the section 2.2 would justify its adoption in the model, even if the focus of this paper were not exactly the effect of FDI on exports. It enters the model with a one-year lag, since it is assumed that it takes some time for the effects of FDI on exports to take place.⁴⁴ The cumulative stock variable has been chosen over the FDI inflows, based on the assumption that the presence and relative importance of foreign investors as described by the cumulative stock variable is a better predictor of overall effects on exports i.e. it is a source of the indirect effects on host economy, which does not disappear over time.⁴⁵ (It should be recalled once again that the aim of the paper is to test for both direct and indirect effects of FDI on exports together at the macroeconomic level.) The same effect could possibly be achieved by using FDI inflows, but this would require using many lags of FDI variable, reducing the number of observations. As for the potential endogeneity of FDI variables, it was mentioned in the previous section that openness is a significant determinant of FDI flows only when measured by the trade liberalization index (Garibaldi et al. 2002). When the measure was the share of the country's trade in GDP, it was not significant, not even when only FDI in the manufacturing sector was considered (Resmini 2000). In addition, the FDI stock variable enters the model with a one year lag, which should further alleviate the potential problem.

⁴⁴ Sun (2001) and Goldberg and Klein (2000) use the same or similar approaches, i.e. Goldberg and Klein also use the second lags for foreign investment variable, which is in their case FDI inflows. Also, the results by Girma et al. (2007) suggest that it takes time for the effects of inward FDI to become visible.

⁴⁵ As it has been explained above, the findings by Barrios et al. (2005) justify the use of cumulative FDI variable.

As macroeconomic theory suggests, one important explanatory variable should be the real effective exchange rate $\ln REER$ (again, the natural logarithm is taken), which should reflect the domestic and foreign price conditions, with an increase of the value of the variable denoting the real appreciation. Thus the coefficient for this variable is expected to be negative. Sun (2001) uses the nominal exchange rate, but this does not fully capture the differences in price levels. There are also other factors influencing price differences, so that the real effective exchange rate seems to be the better choice. Goldberg and Klein (2000) use real exchange rates.

The next independent variable $\ln EM$, tries to capture the demand conditions in the main trading partner economies i.e. developments on the export markets. For this purpose, the natural logarithm of the gross domestic product of developed European economies is used as a proxy after being weighted by the share of exports to these countries in the total country's exports of each CEE country.⁴⁶

The gross domestic product growth rates of the trade partner economies also enter the model of Goldberg and Klein (2000), but not the ones in Sun (2001) or in Zhang and Song (2000). They use the domestic investment as an additional independent variable. This could partly capture the above effect, because domestic investment decisions are based on the expectations regarding the demand conditions at home and abroad. Still, their basic argument for including domestic investment as an independent variable is that it is the main determinant of productive capacity, and therefore of the domestic supply of commodities and thus export supply. They explicitly want to separate the effect of FDI on exports from the export effect of investment in general. This study uses the gross fixed capital formation variable in order to check for the effect of domestic investment $\ln I$, in addition to other variables. Some caution is required in such specification since there may be a causal relationship between FDI and gross fixed capital formation, especially in the case of greenfield investment. Krkoska (2001) finds that in transition countries, although

⁴⁶ Developed countries in Europe are: Austria, Belgium, Denmark, Faeroe Islands, Finland, France, Germany, Gibraltar, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. Weighting is necessary since these markets are not equally relevant for all countries in the sample. According to the UNCTAD Handbook of Statistics (see below), the average share of exports from the countries under study to this region varied from 47% to 58% over the observed period. The smallest values were a little over 10%, for Ukraine in the beginning of the period, and the highest ones exceeded 77%, for Hungary in 1999. The differences are large, which justifies using these shares to weight the GDP of export markets.

many of the FDI inflows were due to acquisitions of local firms in the privatization process, these flows have been a significant source of financing for capital formation. This may represent a problem in estimation, which is at least partly alleviated by using cumulative FDI stock variable instead of inflows. The investment variable also enters the model with a one year lag, with the same justification as with foreign investment.

An index has been added as a proxy for trade liberalization (*TLI*). It can take values between 1 and 4.3, where the lower value stands for less liberalized regime. A change of the trade liberalization index is used as a variable in the estimations. The four model specifications will also be estimated using alternative definitions of the presence of foreign capital and of investment i.e. the share of FDI stock in GDP, and investment share in GDP.⁴⁷

Data on FDI stock, exports, gross fixed capital formation and real effective exchange rates stem from various WIIW publications for all countries except for Baltic countries (WIIW 2003 and Pöschl 2002). The latter are taken from IMF's International Financial Statistics (2003), and various IMF country reports.⁴⁸ All variables are expressed in USD at constant 1995 prices after being deflated using consumer price indices, or if those were not available, retail price indices.⁴⁹ Price indices and the exchange rate data are also taken from WIIW publications (WIIW 2003 and Pöschl 2002), except for the Baltic countries for which they stem from the IMF. Data on the real growth rates and levels of the developed European countries' gross domestic product and their shares in total exports of the countries in the sample are taken from the UNCTAD database, for all countries in the sample.⁵⁰ The values of real GDP are expressed in USD at constant 1995 prices. Data on the trade liberalization index stem from the EBRD.⁵¹

The use of the linear unobserved effects panel data model is appropriate because of some unobserved or omitted country-specific variables, which may influence countries' export performance. The most important examples are geographic location and traffic

⁴⁷ As it will be shown below, the natural logarithms of these variables are highly correlated, so that an alternative definition is used in order to avoid the potential collinearity problem.

⁴⁸ The country reports are available from www.imf.org.

⁴⁹ This may not be the best choice, but the data on producer price indices or labor unit costs were not available for all countries. Repkine and Walsh (1998) also use CPI to deflate trade data.

⁵⁰ The UNCTAD Handbook of Statistics is available on-line at: www.unctad.org.

⁵¹ The index was constructed by EBRD and it is called: "Index of forex and trade liberalization" and is available from www.ebrd.org.

infrastructure (accessibility), natural resource endowments or initial situation with exports, but there may also be relevant policy variables not included in any of the above specifications. Since some of these obviously relevant but omitted variables may be correlated with some explanatory variables, especially with foreign direct investment, the above equations were estimated using the fixed effects method. Unlike the random effects estimator, it is robust in this respect and allows for such correlation (Wooldridge 2002).

Tables 2.3 and 2.4 show the descriptive statistics of the variables as they enter the estimation. Natural logarithms of all variables are taken, except for the trade liberalization index for which first differences are taken, and for the shares of FDI stock and gross fixed capital formation in GDP (FDI / GDP and I / GDP).

Table 2.3: Descriptive statistics

	Mean	Median	Maximum	Minimum	Std. deviation
Exports	8.96	9.04	11.89	7.07	1.20
FDI	7.48	7.54	10.46	0.60	1.66
REER	4.66	4.63	5.14	4.22	0.16
EM	15.38	15.48	15.89	13.74	0.42
I	8.47	8.59	11.32	6.42	1.31
TLI	0.10	0.00	2.00	-1.70	0.39
FDI / GDP	13.07	10.10	53.19	0.04	11.46
I / GDP	21.83	21.39	36.24	10.98	5.22

Table 2.4: Correlation coefficients

	FDI	FDI / GDP	REER	EM	I	I / GDP	TLI
Exports	0.745	-0.021	0.0260	0.040	0.963	0.174	-0.138
FDI	---	0.490	0.334	0.400	0.734	0.490	-0.278
FDI / GDP	---	---	0.466	0.542	-0.069	0.369	-0.137
REER	---	---	---	0.081	0.055	0.236	-0.099
EM	---	---	---	---	0.036	0.171	-0.198
I	---	---	---	---	---	0.241	-0.139
I / GDP	---	---	---	---	---	---	-0.089

FDI variables, exports and investment have relatively high standard deviations, as compared to other variables. In addition, there are high correlation coefficients between these three variables. The correlation coefficient between exports and investment is 0.963 and between exports and FDI 0.745. FDI and investment are correlated with a coefficient of 0.734. The last correlation coefficient in particular may represent a problem in

regression. Therefore, all four specifications are estimated twice: first using the natural logarithms of FDI and investment, and then using the ratios of these variables to GDP as explanatory variables. There are two reasons for this: the first is to alleviate the potential collinearity problem, since the new pair of variables is not that highly correlated, and the second, to check for the robustness of the results to different definitions of the presence of foreign capital.

2.6 Empirical results

As mentioned in the last section, a fixed effect, one way error component panel data model is used here in order to estimate the model specifications (M1) – (M4). This technique is chosen instead of the random effects estimator because the unobserved and omitted variables may be correlated with some of the explanatory variables, which would lead to inconsistent estimates when using the random effects method. The significance of the individual (cross-section) and of time effects has been tested and for all specifications the same results were obtained: the individual effects were highly significant, and time effects were always insignificant. Therefore, only individual effects are allowed for. First, the models were estimated for the complete sample of 14 countries, and then also for two subsamples: separately for eight countries joining the EU in 2004 and the other six countries. This is an implicit test of the robustness of the results, but also of the parameter heterogeneity. Heteroskedasticity and serial correlation robust standard errors are reported for the estimated coefficients (calculated according to Wooldridge 2002). Also, the adjusted R^2 measures capturing only the variance explained by the variables entering the regression, and excluding the portion of variance explained by individual effects (which was always rather high) is reported. This is done for the better understanding of the results, since the adjusted R^2 was always between 0.97 and 0.99 for regressions with dummies for each country (i.e. including the individual effects). That result has been quite constant across specifications and different samples, because an omitted variable would be “picked up” by the individual effect. Leaving out the dummies and calculating the adjusted R^2 only for the part of the variance explained by the variables does not affect the coefficient estimates and provides a better insight in how the effects of the omitted variables vary across different specifications and samples. First, the results for the complete sample are presented in Tables 2.5 and 2.6.

According to the results of the basic specification, model (M1), all three variables have been significant determinants of export performance, with the expected signs. FDI was significant only at 10% significance level. The portion of the variance explained by them is not very high and amounts to 0.328. The impact of FDI on exports was weaker than that of the other two variables: a 1% increase in FDI stock leads to 0.04% growth of exports for the complete sample and model (M1). Introducing investment and trade liberalization variables in the model, separately and together, increases somewhat the value of the adjusted R^2 .

Table 2.5: Complete sample, results I

Dependent variable: EXPORTS				
	Model (M1)	Model (M2)	Model (M3)	Model (M4)
FDI	0.0457* (0.0261)	0.0269 (0.0274)	0.0549** (0.0243)	0.0358 (0.0261)
REER	-0.6464*** (0.1320)	-0.6906*** (0.1276)	-0.6300*** (0.1348)	-0.6742*** (0.1302)
EM	0.5863*** (0.1217)	0.6221*** (0.1231)	0.5832*** (0.1162)	0.6180*** (0.1190)
I	---	0.1961** (0.0770)	---	0.1889** (0.0747)
TLI	---	---	0.0650** (0.0319)	0.0585** (0.0286)
R^2_{adj}	0.328	0.358	0.336	0.363
Observations	112	112	112	112

Heteroskedasticity/serial correlation - robust standard errors are in parentheses. ***, **, * indicate significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Both new variables enter the regression significantly and with positive signs, as expected. Inclusion of the investment picked up the effects of FDI on exports, i.e. it made the FDI variable insignificant and its coefficient was lowered. Real effective exchange rates and export markets remain highly significant across all specifications.

In order to alleviate the potential collinearity problem between FDI and investment variables that was described earlier, all four models were estimated again using the shares of FDI stock and gross fixed capital formation in GDP, as explanatory variables (Table 2.6). The results show that with these alternative definitions of variables, FDI remains highly significant in all models and the investment turns out to be insignificant. Other

results are basically unchanged, except that the value of the adjusted R^2 is now higher (it amounts to little over 0.4) and almost equal for all specifications.

Table 2.6: Complete sample, results II

Dependent variable: EXPORTS				
	Model (M1)	Model (M2)	Model (M3)	Model (M4)
FDI / GDP	0.0120*** (0.0034)	0.0114*** (0.0035)	0.0120*** (0.0034)	0.0115*** (0.0035)
REER	-0.7906*** (0.1233)	-0.8013*** (0.1233)	-0.7854*** (0.1246)	-0.7963*** (0.1247)
EM	0.4395*** (0.1095)	0.4455*** (0.1100)	0.4599*** (0.1060)	0.4668*** (0.1074)
I / GDP	---	0.0060 (0.0054)	---	0.0062 (0.0053)
TLI	---	---	0.0465* (0.0269)	0.0480* (0.0266)
R^2_{adj}	0.419	0.420	0.422	0.423
Observations	112	112	112	112

Heteroskedasticity/serial correlation - robust standard errors are in parentheses. ***, **, * indicate significance at the 1 percent, 5 percent and 10 percent levels, respectively.

The next step was to estimate the models for a smaller sample of eight new EU member states (including the five Central European countries and three Baltic countries). On average, and in most cases also individually, these countries are more advanced in the transition process than the rest of the sample, and thus also in trade liberalization (especially in trade with the EU due to liberalization steps in the European Agreement). They are also characterized by greater macroeconomic stability and better performance and it was known for some time that they would be the first among transition countries to join the EU. For all these reasons, they have been able to attract more FDI relative to their GDP than the rest of the sample (though with some exceptions). The results for this group of countries are presented in the Tables 2.7 and 2.8. For all four models, foreign investment, exchange rates and export markets have been significant determinants of export performance, all with the expected signs. The adjusted R^2 is somewhat higher than for the full sample and relatively constant. It should be noted that the coefficient for the FDI variable is substantially higher for the new EU member states than for the complete sample, reflecting the stronger positive contribution of FDI to export promotion, possibly due to the different types of foreign investments attracted by these countries. Neither domestic investment nor trade liberalization was found to be significant. The latter may possibly be explained by the fact that there was very little variation in the trade

liberalization index for these countries in the period under observation, since these economies undertook their liberalizing steps relatively early in the transition. As for the investment variable, the results change in regressions with alternative definitions of the FDI and investment variables (Table 2.8). Investment becomes significant, with a positive impact on exports and without changing the results for other variables.

Table 2.7: New EU member states, results I

Dependent variable: EXPORTS				
	Model (M1)	Model (M2)	Model (M3)	Model (M4)
FDI	0.2003*** (0.0545)	0.1474* (0.0769)	0.2049*** (0.0522)	0.1531** (0.0762)
REER	-0.8281*** (0.2790)	-0.8234*** (0.2735)	-0.7983*** (0.2776)	-0.7967*** (0.2728)
EM	0.4964*** (0.1671)	0.5118*** (0.1796)	0.4940*** (0.1667)	0.5092** (0.1796)
I	---	0.1808 (0.1354)	---	0.1755 (0.1363)
TLI	---	---	0.0642 (0.0677)	0.0577 (0.0688)
R ² _{adj}	0.394	0.397	0.388	0.391
Observations	64	64	64	64

Heteroskedasticity/serial correlation - robust standard errors are in parentheses. ***, **, * indicate significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 2.8: New EU member states, results II

Dependent variable: EXPORTS				
	Model (M1)	Model (M2)	Model (M3)	Model (M4)
FDI / GDP	0.0123** (0.0053)	0.0122** (0.0050)	0.0124** (0.0053)	0.0123** (0.0050)
REER	-0.7559*** (0.2763)	-0.7804*** (0.2676)	-0.7338*** (0.2712)	-0.7499*** (0.2629)
EM	0.5493*** (0.1853)	0.4776*** (0.1783)	0.5515*** (0.1852)	0.4786*** (0.1787)
I / GDP	---	0.0137** (0.0068)	---	0.0141** (0.0068)
TLI	---	---	0.0416 (0.0533)	0.0586 (0.0600)
R ² _{adj}	0.400	0.422	0.392	0.416
Observations	64	64	64	64

Heteroskedasticity/serial correlation - robust standard errors are in parentheses. ***, **, * indicate significance at the 1 percent, 5 percent and 10 percent levels, respectively.

For the group of six other countries (including four Southeast European countries, Russia and Ukraine), which did not join the EU in 2004, the results are somewhat different

(Tables 2.9 and 2.10). Foreign direct investment and real effective exchange rates are significant and have the theoretically predicted signs in all four models except for the FDI variable in the first model specification. The coefficients of the FDI variable are lower than for the sample of eight new EU member states in all, and for the complete sample, in the first and third model specifications. The exchange rates coefficients, on the other hand, are larger (in absolute value) for this group. While trade liberalization has also turned out to be a significant factor for export performance, export markets were an important determinant only in models not including investment, indicating some possible collinearity between these two variables. This unexpected relationship cannot be detected by observing the simple correlation coefficients between these variables in this sample, which are negative, but not very high.

Table 2.9: Southeast Europe, Russia and Ukraine, results I

Dependent variable: EXPORTS				
	Model (M1)	Model (M2)	Model (M3)	Model (M4)
FDI	0.0315 (0.0230)	0.0514* (0.0294)	0.0392* (0.0212)	0.0600** (0.0271)
REER	-0.8290*** (0.1203)	-0.8494*** (0.1143)	-0.8161*** (0.1246)	-0.8365*** (0.1185)
EM	0.3707*** (0.1388)	0.2053 (0.1673)	0.3720*** (0.1261)	0.2019 (0.1549)
I	---	-0.2037** (0.0990)	---	-0.2096** (0.0921)
TLI	---	---	0.0525** (0.0254)	0.0549** (0.0248)
R ² _{adj}	0.477	0.503	0.488	0.517
Observations	48	48	48	48

Heteroskedasticity/serial correlation - robust standard errors are in parentheses. ***, **, * indicate significance at the 1 percent, 5 percent and 10 percent levels, respectively.

The investment itself is highly significant, but has a negative impact on exports. If there were no strange relation to the export markets variable, one could construct (speculative and probably unreliable) scenarios in which investment negatively influences exports.⁵²

Both this result and the unusual relationship between investment and export markets are robust to using alternative definitions of FDI and investment variables. Another reason for

⁵² For example, that domestic consumption growth was the primary determinant of domestic investment, leaving no or very few resources that could have been devoted to building or extending the production capacities for exports. Moreover, some of the capacities that have been used to produce for foreign markets are used to produce for domestic one.

being cautious about these findings is that the number of observations for this sample is lower than for the previous estimations, possibly affecting the reliability of results. It should be noted that in regressions with alternative definitions of investment and FDI, the trade liberalization variable becomes insignificant. Overall, for this group of countries more variance of export performance is explained by the variables used in regression than for other samples. Adjusted R^2 reaches values of over 0.5 for models (M2) and (M4) in the first, and for all models in the second set of results.

Table 2.10: Southeast Europe, Russia and Ukraine, results II

Dependent variable: EXPORTS				
	Model (M1)	Model (M2)	Model (M3)	Model (M4)
FDI / GDP	0.0081*** (0.0026)	0.0112*** (0.0028)	0.0082*** (0.0025)	0.0112*** (0.0027)
REER	-0.8951*** (0.1189)	-0.8966*** (0.1063)	-0.8946*** (0.1203)	-0.8961*** (0.1072)
EM	0.3491*** (0.1206)	0.2025 (0.1241)	0.3759*** (0.1125)	0.2292** (0.1168)
I / GDP	---	-0.0216*** (0.0069)	---	-0.0210*** (0.0067)
TLI	---	---	0.0396 (0.0249)	0.0338 (0.0255)
R^2_{adj}	0.511	0.567	0.513	0.567
Observations	48	48	48	48

Heteroskedasticity/serial correlation - robust standard errors are in parentheses. ***, **, * indicate significance at the 1 percent, 5 percent and 10 percent levels, respectively.

2.7 Conclusions

The relationship between international factor movements and international trade has been at the center of extensive theoretical and empirical research by many economists for a long time. There have also been many recent contributions, supplementing the earlier findings by introducing additional aspects in the literature. For example, attempts have been made to explain the emergence of multinational enterprises and their significant role in determining the directions and extent of international trade flows. Also, analyses of the indirect effects of foreign-owned enterprises on domestic firms through spillovers have emerged. The aim of this paper was to investigate whether the foreign direct investment in countries of Central and Eastern Europe has affected the export performance of the host economies. An overall macroeconomic approach was used in order to encompass the direct as well as the indirect effects. The results indicate that FDI had an unambiguously positive

and significant impact on the exports of these countries, for the whole sample, as well as for the two subsamples – the more advanced transition economies – new EU member states, and a group of, on average, less advanced countries comprising four Southeast European countries, Russia and Ukraine. It is found that the positive impact of FDI on exports was much stronger in the first subsample, possibly reflecting the fact that these countries have managed to attract more export-oriented FDI. Other highly significant determinants were real effective exchange rates and the development in export markets. These results were confirmed after controlling for the effects of domestic investment (except for the export markets variable for the second subsample) as well as for trade liberalization. The findings on these last two variables are mixed for different samples and specifications.

This paper shows that attracting FDI can have export-promoting effects. It is becoming relatively more important as the choice of other export-promoting instruments narrows down, as a consequence of international trade agreements, or because some of them, such as direct export subsidies to specific industries, turned out to be ineffective in many cases. This is especially important for those CEE countries whose goal is to join the EU and which are therefore, or are about to become, subject to even more restrictive regulations. However, since governments are aware of the various potential beneficial effects of foreign investment for the host economies, there is very vigorous international competition for FDI. This competition is also subject to some international rules. Although these are less restrictive than trade-related regulation and although there are still ways to affect the location and exporting decisions of MNEs, countries are less and less able to make some of the favorable conditions offered to foreign investors contingent upon the MNEs' export performance (except for the group of the least developed countries, UNCTAD 2002, p. 211). Government agencies can still target the potential exporters, but without being able actually to condition their incentives. It can therefore be expected that policy measures will be shifting more and more toward exploiting potential indirect effects i.e. targeting "better" FDI (from which more spillover effects are expected in terms of new technologies or skills) and/or promoting linkages between foreign and domestic firms. It is also possible to target export-oriented FDI indirectly by means other than incentives, i.e. by providing the specific services, infrastructure or human resources that might be required by the export-oriented firms. Such a policy would simultaneously lower the costs for the domestic firms to become exporters. One could argue that measures of this kind should be enough, i.e. that

a country can create an exporter-friendly environment by itself, and thus, increase the export competitiveness of domestic firms without 1) attracting FDI at all, or 2) without investing additional efforts and resources (e.g. in the form of incentives) in order to attract export-oriented foreign investors. While it is likely that a country can succeed in promoting its exports without attracting FDI, the latter can obviously help speed up the process and magnify the impact (as shown in this paper) and should be considered at least as a supplementary measure.⁵³ This is probably more important in less developed host countries, lacking the resources, institutions and possibly also knowledge in providing important services for potential domestic exporters.⁵⁴ In addition, only to create an exporter-friendly environment is in most cases not enough to attract a foreign investor. This may at best be supported by the empirical fact that even the rich industrialized countries offer special conditions for some foreign investors (UNCTAD 2002, p. 204). A possible explanation may be that attracting FDI is a “prisoner’s dilemma” type of game, and if others “play the game”, in sense that they choose the strategy of offering FDI incentives, then it is better for a single country to play it as well, although everybody (the “world” i.e. all countries together) could possibly be better off without offering FDI incentives.⁵⁵

It should be mentioned in the context of EU accession that, as shown by Breuss et al. (2001, 2003), the redistribution of structural and cohesion funds due to enlargement may affect the distribution of FDI within the enlarged European Union. Since more funds will be redirected to new member states (at the expense of old EU members), they will be able to use them in order to reduce the fixed costs of investment and in this way, to affect the location decisions of foreign investors. This allows for an optimistic view for new EU member states in promoting FDI and, in this way, improving their export performance.

While the results of this paper about the link between FDI and exports seem to be rather convincing, a few remarks should be made on the potential impact of exports on growth.

⁵³ Moreover, it is quite possible that attracting an export-oriented FDI or any FDI can be nothing but a supplementary measure in successful export promotion. It should be stressed again that the potential negative effects from FDI can occur if policy concentrates solely on foreign investors.

⁵⁴ On the other hand, if the host economy is too backward in terms of human capital and technology, this may be an obstacle for exploiting the indirect effects of FDI on domestic firms (Lipsey 2002).

⁵⁵ There is a large literature on competition for FDI and the welfare effects of FDI incentives, but since this is not at the focus of this paper, only this basic intuitive explanation is given. It must however be noted, that there may be conditions, under which FDI incentives are welfare increasing for the whole “world” (see e.g. Fumagalli 2003). See also Chapter 1 for a discussion of literature on competition for FDI.

Although the empirical evidence on such a positive relationship between these two variables is not always very persuasive, this link can at least be regarded as a potential one. Thus, policy makers attach very high value to export promotion, regardless of the mixed evidence in the literature. So potentially, FDI might have been promoting the growth of the CEE countries by promoting exports. Mencinger (2003) states that this has not been the case and that FDI did not lower current account restrictions for these economies. He argues that MNEs contributed more to imports than to exports, and that, therefore, there was no positive indirect impact of FDI on growth via exports. This, however, is a superficial argument at least. If MNEs' imports contained a significant portion of the capital goods and machinery used for later production, and/or enabled faster enterprise restructuring (in the case of acquired domestic firms) allowing the firms to take advantage of the market access to EU, than this may have enhanced growth. Exactly the latter is found to be the case for some CEE countries in the study by Repkine and Walsh (1998). This finding is also reinforced by the conclusions from UN/ECE (2000). In addition, some economists argue that there is a direct positive effect of FDI on growth, but the evidence concerning this relationship for transition countries is again mixed (see for example Campos and Kinoshita 2002 or Mencinger 2003).

Chapter 3:

Impact of Foreign Direct Investment on Croatian Manufacturing Exports

Abstract

This chapter is a more detailed, sector-level analysis of the relationship between foreign direct investment inflows (FDI) and the exports of Croatian manufacturing industry. The exports of Croatian manufacturing industry have been stagnating over the last decade or so. Over the same period there have been relatively high inflows of FDI into the industry. The aim of this paper is to examine whether these inflows have had an impact on export performance after controlling for other potentially significant variables. Using the panel data approach for 21 branches of the manufacturing industry over the period between 1996 and 2002, it is found that FDI has had positive and statistically significant impact on exports: a 1% increase in inward FDI stock leads to a 0.09% increase of exports. This implies that there is a potential for improving the export performance of Croatian manufacturing industry by attracting more FDI into this sector. Policy makers should try to enhance the potential positive effects of foreign investment by targeting specifically export-oriented foreign direct investment, and, in addition, implement measures to increase potential spillover effects.

3.1 Introduction

Recent literature and the experience of some other countries indicate that there may be export-promoting effects from inward foreign direct investment (FDI). Indeed, the analysis in the last chapter, at macroeconomic level, shows that this is also the case for transition countries. But although Croatia has been relatively successful in attracting foreign investors as measured in cumulative FDI stock per capita, stagnating exports over the same period at first glance imply that this has played no role in promoting exports. However, more detailed analysis of this relationship is needed, to account for the effects of other potentially important variables and allowing for differences across different manufacturing sectors before drawing such a conclusion.

Since the successful implementation of the stabilization program in 1993, Croatia has enjoyed the benefits of price and exchange rate stability. It was expected that, in such an environment, enterprises would be able to restructure in the medium term and that they would be able successfully to compete in the increasingly open domestic and export markets. However, Croatian manufacturing industry did not manage the necessary restructuring well, which has been reflected in, among other things, weak development of the industry's exports over the last decade (Nikić 2003). There have been several reasons for stagnating exports over this period, like for example the loss of important export markets in some other former republics of Yugoslavia, war conditions in Croatia and in the wider region, slow and inefficient privatization, low investment levels, too slow integration in European and the world economy, or low export competitiveness. As a consequence, the exports of goods from Croatia to 12 EU countries, which amounted to 0.34% of the EU imports in 1993, fell to 0.19% in 2000. Over the same period, the corresponding percentage for the group of Central and Eastern European countries doubled (Galinec and Jurlin 2002).

Since it is accepted that higher exports can contribute to accelerating economic development ("export-led growth" strategy), promoting exports has become one of the most important tasks of Croatian economic policy (at least on paper). In the Croatian case, high trade deficits on the current account of the balance of payments over the last decade underline the priority of export promotion (Stučka 2004). There are few different policy measures that can be applied in order to accomplish this goal. Many domestic economists argue that the problem mostly arose because of too strict exchange rate policy and an overvalued currency over the period since the implementation of the stabilization program, and thus propose currency depreciation as a necessary policy measure (Nikić 2003). On the other hand, some argue that wages rose too fast relative to productivity increases making industrial production in Croatia too expensive and thus vitiating export competitiveness. Another problem contributing to the relatively low competitiveness of manufacturing industry is a lack of modern technology (and possibly of capacity) in production which is due to comparatively low investment rates during the war period and the years thereafter (Galinec and Jurlin 2002).

The first aim of this chapter is to investigate the determinants of the weak export development over the observed period. Among other macroeconomic variables, special attention is given to the role of the increasing FDI stock in Croatian manufacturing industry for its exports. Some policy recommendations will be given, which should contribute to building and/or strengthening the link between FDI and exports in future.

An overview of relevant theory on the relationship between FDI and trade, as well as of relevant empirical studies was given in the last chapter. The structure of this chapter is as follows: First, some developments in the Croatian economy relevant for exports and competitiveness are briefly described. Section 3.3 then gives a descriptive representation of the relevant data and states the econometric model that will be tested. The results of the estimations are presented and discussed in section 3.4 and the last section gives conclusions and policy recommendations.

3.2 Some important developments in Croatian economy since the stabilization program

It has been a widely accepted fact among policy makers (although there still remains some degree of disagreement among academic economists) that exports can help in accelerating economic growth. Gains are expected in form of increased employment, income and efficiency, increased foreign exchange earnings, economies of scale etc. (UNCTAD 2002).⁵⁶ This and the high trade deficits on the current account of the Croatian balance of payments over the last decade are the main reasons why export promotion has become one of the most important economic policy issues in Croatia. In order better to understand the causes of weak export developments in Croatia, some studies on this topic are briefly reviewed.

According to Nikić (2003), probably the most important reason for stagnating manufacturing industry exports has been the overvalued currency. He sees the seeds of overvaluation in the stabilization program from 1993. Although the Croatian currency was devalued by 20% in October that year, according to Nikić (2003), the resulting increase in prices was more than proportional which led to a 50% overvaluation of the domestic

⁵⁶ See introduction to chapter 2 for more information and references about the link between exports and growth.

currency. In the following months, the currency started to depreciate, but insufficiently in order to compensate for the preceding rise. As an overall result, inflation has been eliminated successfully (see Table 3.1), but at the cost of the overvalued currency which, according to Nikić (2003), has been too heavy a burden for the industry to successfully restructure and cut the costs of production.

In the end of 1995 there was a strong increase in wages and public expenditures, which led to further deterioration of exporters' competitiveness. Nikić (2003) concludes that at around this time, domestic production was partly substituted for by imported goods. In addition, he recognizes other problems which have slowed down the restructuring of enterprises and were more of an institutional and legal nature, such as the lack of transparency in the privatization process and the slow adjustment of legal framework.

Table 3.1: Macroeconomic performance 1994-2002

	1994	1995	1996	1997	1998	1999	2000	2001	2002
Real GDP growth ¹ (in %)	5.9	6.8	6.0	6.5	2.5	-0.9	2.9	4.4	5.6
GDP ² (Mio. USD, current prices)	14585	18811	19872	20109	21628	19906	18427	19863	23046
Household expenditure ² (% of GDP)	53.3	63.9	60.5	62.2	58.9	57.6	58.8	59.2	59.6
Government expenditure ² (% of GDP)	29.4	29.4	27.1	25.9	26.6	27.8	26.1	22.9	22.4
Gross capital formation ² (% of GDP)	17.4	17.6	21.9	27.5	24.0	23.0	20.2	23.9	29.1
Inflation ^{1,3} (in %)	97.6	2.0	3.5	3.6	5.7	4.2	4.6	3.8	1.7
Unemployment rate ¹ (end year, in %)	14.5	14.5	10.0	9.9	11.4	13.6	15.7	16.4	14.5
General government balance ¹ (% of GDP)	1.2	-1.4	-1.0	-1.9	-1.0	-8.2	-7.5	-6.8	-4.9
General sales taxes – revenue ^{2,4} (billion of Croatian kuna)	13.1	12.8	13.5	15.1	22.2	20.2	22.0	23.4	26.5
Foreign debt ¹ (billion USD)	3.02	3.81	5.31	7.45	9.68	10.14	11.28	11.87	15.68

Source: ¹ EBRD, ² Central Bureau of Statistics (CBS); ³ retail prices until 2000; for 2000-2002 consumer prices; ⁴ until 1997 mostly Turnover Tax, in 1998 and afterwards mostly Value Added Tax.

Also, productivity increases in industry, which mostly arose through a reduction of the number of employees, were offset to a great extent by the high increases in wages and public expenditures financed by higher tax burdens. At the same time, the levels of domestic investment and inflows of foreign capital remained relatively low. So, according

to Nikić (2003) although the GDP growth rates from 1995 to 1997 were rather high, with a slowdown over the next two years and a new increase after 2000, this development was mostly due to increased domestic consumption. The data on macroeconomic performance from 1994 to 2002 in Table 3.1, only partly supports the above conclusions. Between 1995 and 1997 gross capital formation rose from 17.6% of GDP to 27.5%, the share of government expenditure in GDP declined and household expenditure remained at the approximately same level (slightly above 60% of GDP).

Further problems were created for the enterprises as value added tax was introduced in 1998, replacing the existing turnover tax, and additionally increasing the total tax burden (Nikić 2003). The numbers in Table 3.1 on general sales tax revenues support this view, since the largest increase of this part of revenue happened in 1998, in which it amounted to 22.2 billion of Croatian kuna, while in 1997 it was 15.1 billion kuna.⁵⁷ This was followed by further increases of public spending, which rose faster than public revenues, causing the public sector to accumulate debts to the private sector and leading to general illiquidity in the economy. This raised the interest rates, and thus, financing costs for the firms. The situation improved somewhat in 2000 as more discipline was introduced into public spending. The data in Table 3.1 supports these conclusions as the share of government expenditure in GDP rose from 25.9% in 1997 to 27.8% in 1999. At the same time, the government balance reached its lowest value in 1999 with a deficit of 8.2%.

Over the whole period, the trade deficit was high due to stagnating exports and expanding domestic consumption contributing to higher imports. This was favored by the overvalued currency, which made imports relatively cheap. Such developments led to a fast expansion of foreign debt over the last few years, which could potentially endanger the macroeconomic stability of the Croatian economy, attaching even higher priority to export promotion among economic policy tasks (foreign debt increased from around 3 billion USD in 1994 to more than 15 billion USD in 2002, see Table 3.1).

Although the trade deficit is partly covered by surplus in trade in services (mostly tourism income) and workers' remittances, the current account as a whole has registered deficits throughout the last decade reaching its lowest value of -12.5% of GDP in 1997 (see Table

⁵⁷ The item „General sales taxes“ in the reports of Croatian Central Bureau of Statistics, comprises mostly the old Turnover Tax before 1998, and Value Added Tax in 1998 and afterwards.

3.2). Even if net tourism income completely covered the trade deficit, it creates mostly seasonal employment and is also very sensitive to reversals in “tourism fashion” and security crises, and thus, cannot induce all of the potential benefits of stronger export performance (Stučka 2004).

Table 3.2: Current account – Goods and services, in million USD

	1994	1995	1996	1997	1998	1999	2000	2001	2002
Goods (balance)	-1278	-3228	-3488	-5383	-4071	-3299	-3204	-4101	-5649
Exports ¹	4403	4517	4677	4021	4581	4394.7	4567	4759	5004
Imports ²	-5681	-7744	-8165	-9404	-8652	-7693	-7771	-8860	-10652
Services (balance)	1628	1047	1580	2024	2077	1625	2268	2927	3155
Balance of goods and services	349	-2180	-1908	-3359	-1995	-1673	-936	-1174	-2494
Current account balance ³	-4.9	-7.5	-4.8	-12.5	-6.7	-7.0	-2.5	-3.6	-8.4

Source: Croatian National Bank (CNB), ¹ Exports (f.o.b.) adjusted for coverage, ² Imports (c.i.f.) adjusted for coverage and classification, ³ in % of GDP

Nikić (2003) argues that depreciation is needed in order to change these developments. However, Babić (2002) shows, using time series analysis, that exchange rate is a weak explanatory variable of exports. In addition, Stučka (2004) estimates that a 1% permanent devaluation results in an improvement of the trade balance of 1.34% at best. These rather limited potential benefits have to be weighed against several possible adverse effects. The first, emphasized by both Nikić (2003) and Stučka (2004), is the potential instability through depreciation via an inflation spiral, which can also offset all the benefits of depreciation for exporters. In addition, both authors also recognize that the Croatian economy is strongly characterized by currency substitution (“euroization”). This has led to a high level of indexed debt (initially to the German mark, then to the Euro) held by households and enterprises (Stučka 2004), meaning that a depreciation would have strong redistribution effects (from debtors to creditors) and is politically questionable as a mean of achieving economic policy goals. In the more extreme scenario, it could also lead to instability of the financial system if many debtors become unable to pay back their loans. Other adverse effects of a currency devaluation mentioned by Stučka (2004) include e.g. a fall in real domestic income due to the increase in import prices; potential sensitiveness of industries to increases in import prices of intermediate goods; a shift of resources to the tradable sector, possibly causing a wage gap and resulting in higher unemployment; and

adverse impact on public finances through increased domestic currency cost of debt servicing.

All of the above arguments lead to the conclusion that currency devaluation can hardly induce the desired export-promoting and trade balance-improving effects, at least not of the needed extent and without causing other serious problems. Another instrument that cannot be implemented in order to improve the present situation is the administrative import barrier, which is unacceptable due to valid international agreements and the Croatian determination for stronger integration in the European and world economy. All other export promoting measures, broadly speaking, should improve the productivity of the enterprises and lower the costs of production.

One of the most important reasons for the weak export development was the slow integration of the Croatian economy into the European and the world economy, i.e. a comparatively low degree of trade liberalization. Croatia joined the WTO only at the end of 2000, and by the end of 2001, Croatia had free trade agreements only with Bosnia and Herzegovina, Slovenia and FYR Macedonia (Galinec and Jurlin 2002). This is an important obstacle to strong export performance. Studies surveyed by Galinec and Jurlin (2002) estimate that, for example, the status of EU accession candidate country brought an increase in exports between 30% and 90% to some Central and Eastern European countries. However, Galinec and Jurlin (2002) also emphasize that stronger integration does not bring about higher exports automatically, as shown by the Bulgarian example, while for example, China, at the same time managed substantially to increase its exports to the EU. They stress the importance of export competitiveness in which they give special attention to wages and productivity and unit labor costs. They argue that the roles of the exchange rate changes, of the unit labor cost changes, as well as of the wage levels (in international comparison) have not been that important in determining export performance in Croatia between 1995 and 2001. This finding is supported by conclusions from Švigir (2004), who analyzes the export performance of groups of different manufacturing industries and the average productivity and wages developments within these groups. However, both of these studies, as well as the conclusions from Nikić (2003), are based on more or less simple observations of simple correlation coefficients. Needless to say, more rigorous econometric investigation is needed in order to assess the determinants of Croatian exports.

Except for the potential export determinants mentioned above, there is another potentially important variable which has not yet been analyzed at all in this context for Croatia. It is widely accepted that inward foreign direct investment may influence a host country's export performance.⁵⁸ Croatia has been relatively successful in attracting foreign investors at the overall level, as measured by the percentage of inward FDI stock in gross domestic product over the last decade, but especially since more political stability was created. This percentage amounted to 28.4% in 2002, while the average for the whole region of Central and Eastern Europe was 20.8% in the given year (UNCTAD 2003). As for the sectoral composition of inward FDI stock in Croatia, around 36.1% was concentrated in the manufacturing industry (WIIW 2003, data for 2001, only equity capital). This is only slightly below the corresponding values for advanced transition countries, new EU member states, ranging from 36.2% in Slovenia to 43.8% in Slovakia (WIIW 2003, data for 2001, only equity capital). On the other hand, the great majority of the FDI inflows to Croatia were through acquisition of the existing companies (mostly through privatization), while greenfield investment amounted to only 16.6% of total FDI, and was mostly concentrated in the sector of services (Škudar 2004). Greenfield investment in the manufacturing sector was relatively evenly distributed among sectors, but there were very few export-oriented projects (Škudar 2004). Considering that exports were stagnating over the same period, one could conclude at the first glance that FDI did not play any export-promoting role. Again, more careful econometric examination of this potential link is needed in order to account for the influences of other important variables. In the next section the data is examined and an econometric model is presented.

3.3 Data and the model

The data used in this paper are for the period between 1996 and 2002. They encompass 21 branches of the Croatian manufacturing industry according to the National Classification of Economic Activities (NCEA).⁵⁹ Data on exports, productivity index, average monthly gross wages, gross domestic product, gross fixed capital formation, employment, and

⁵⁸ See sections 2.2 and 2.3 of chapter 2 of the dissertation for an overview of theoretical and empirical literature on FDI and exports.

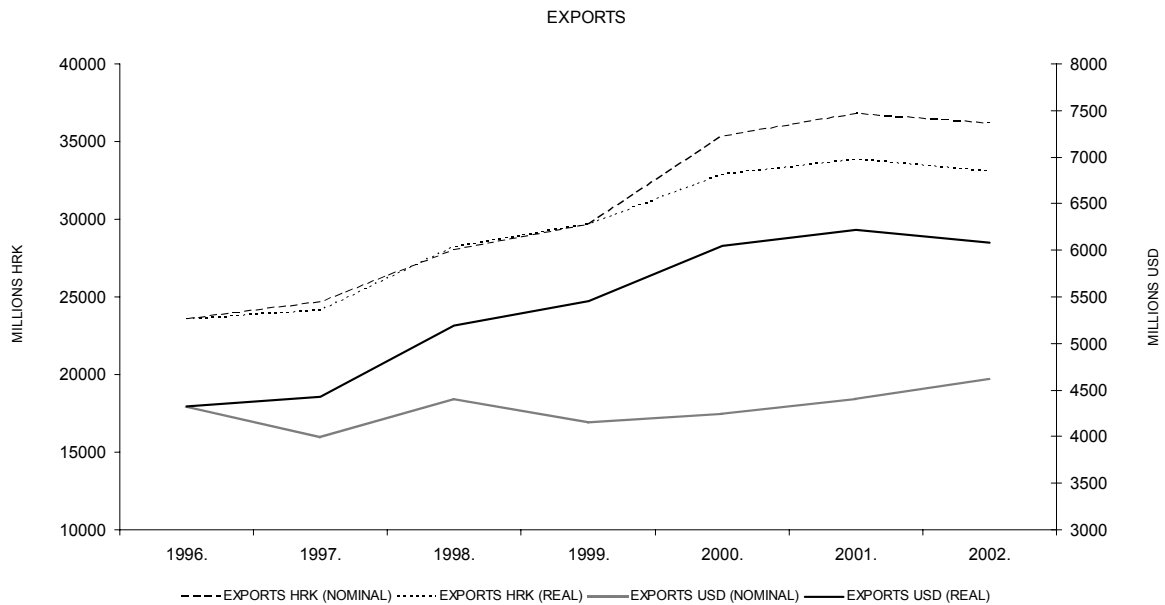
⁵⁹ Manufacturing industry encompasses NCEA subsections 15 – 37. In this research, subsection “37 Recycling” was left out because there are no exports for this branch, and subsection “30 Manufacturing of office machinery and computers” was left out because of missing data on productivity. See Appendix 3-A for an overview of manufacturing industry by branches.

production price index (PPI) are obtained from the Central Bureau of Statistics of the Republic of Croatia (CBS), and the data on FDI and real effective exchange rates are obtained from the Croatian National Bank (CNB). Unit labor costs index was constructed as in Carstensen and Toubal (2004):

$$ULC_{jt} = \frac{W_{jt}E_{jt}}{GDP_{jt}} \quad (3.1)$$

where ULC stands for unit labor costs, W for average monthly gross wages, E is total employment and GDP is a gross domestic product of sector j in year t . Data on exports, FDI stock, wages, GDP and domestic investment were deflated using the PPI and converted into USD values. The base year for these data and other indices is always 1996. The PPI was available by branches only for the years 1998-2002, so that for the previous two years, the aggregate PPI was used for all branches. Index of productivity is calculated by the CBS as a relation between the total volume index of industrial production and the index of persons in employment. Figure 3.1 shows the development of aggregate manufacturing industry exports over the period 1996-2002.

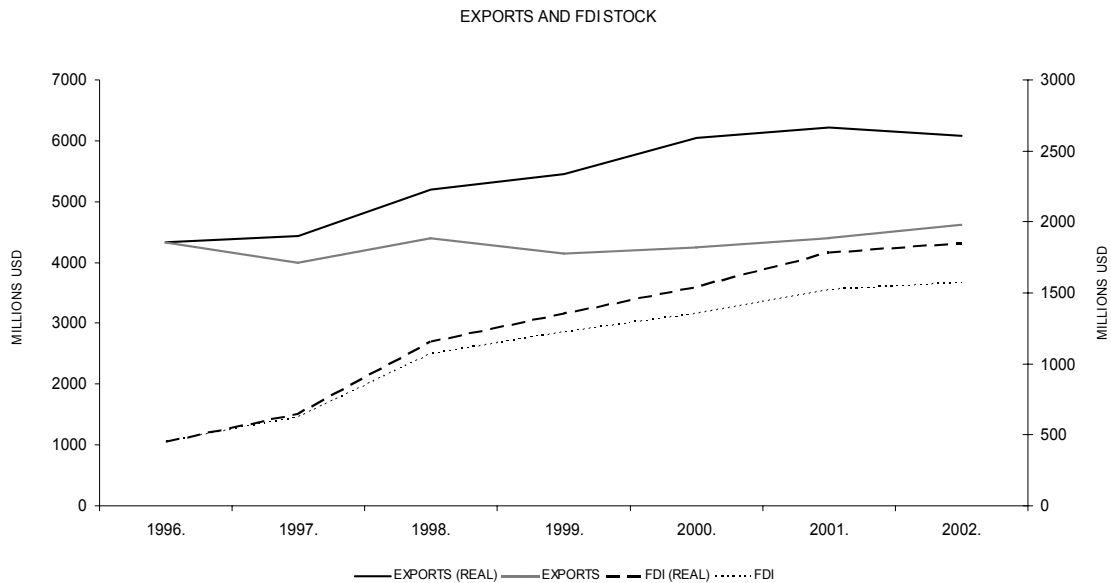
Figure 3.1: Exports of Croatian manufacturing industry 1996-2002



The relevant variable in the public discussions on stagnating exports is the one in USD and current prices. The nominal value of exports expressed in Croatian currency – the kuna

(HRK) – was increasing over the whole period except in 2002. The same is true for the real values of exports expressed in HRK and in USD. For the need of this research, real values were used in order to exclude the effects of price level changes. In order to obtain those, the HRK value of exports was deflated by Croatian PPI.

Figure 3.2: Exports and FDI stock 1996-2002

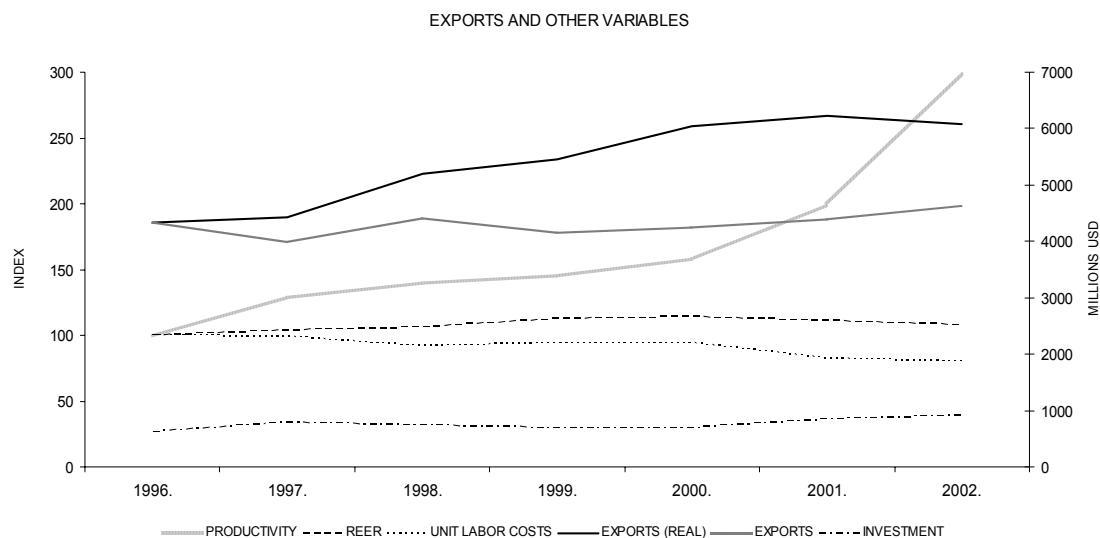


Note: FDI stock – right axis, exports – left axis

Comparing the real USD exports with real FDI stock variables over the period under study (Figure 3.2), one can observe very similar, increasing development for both variables except for the mentioned exception for exports in 2002.

Figure 3.3 compares the exports with the development of other relevant variables for the whole manufacturing sector: productivity index, real effective exchange rate (REER) and unit labor costs indices and domestic investment (gross fixed capital formation). Productivity in the manufacturing industry increased over the whole period. This should have promoted exports along with decreased unit labor costs. As for the real effective exchange rate index (defined so that an increase in index denotes real depreciation), it rose the first four years of the observed period, reaching a peak in 2000 with an index value of 114.09, and falling afterwards. Domestic investment increased in 1997, but decreased over the following two years. It rose again over the last three years under observation.

Figure 3.3: Exports, productivity, investment, unit labor costs and real effective exchange rate



Note: Productivity, REER and unit labor costs – left axis, exports and investment – right axis

The above developments were not common for each branch of manufacturing industry. The heterogeneity within the sector is visible from Table 3.3. There were two branches for which average growth of real exports has been negative over the observed period – subsections 18 *Manufacture of wearing apparel; dressing and dyeing of fur* and 19 *Tanning, handbags, saddlery, harness and footwear*, with average growth values of -1.87 and -1.74% respectively. For all other branches average growth was positive with the maximal value of 57.6% for subsection 35 *Manufacture of other transport equipment*. The inflow of foreign direct investment was unequally distributed over the branches so that the resulting FDI stock was highly concentrated in branches 15 *Manufacture of food products and beverages*, 24 *Manufacture of chemicals and chemical products* and 26 *Manufacture of other non-metallic mineral products*. These were not industries with exceptionally high export growth. Two industries with the negative productivity growth were 18 *Manufacture of wearing apparel; dressing and dyeing of fur* and 32 *Manufacture of radio, television and communication equipment and apparatus*. While subsection 18 was characterized with negative export growth, the latter's exports grew by an average growth rate of 23.03%. The highest average productivity growth was observed in industry 34 *Manufacture of motor vehicles, trailers and semi-trailers*, which had no exceptional values for exports and FDI stock. It amounted to 84.93%. As for the unit labor costs, most industries experienced a fall on average, which was rather high in branches 24 *Manufacture of chemicals and chemical*

products and 33 *Manufacture of medical, precision and optical instruments, watches and clocks*. The highest increase in unit labor costs was observed in industry 27 *Manufacture of basic metals* where it amounted to 6.4%. The only industry with a negative average growth of domestic investment was 16 *Manufacture of tobacco products*, with a value of -12.51%. The two highest average growth rates of the same variable were in industries 23 *Manufacture of coke, refined petroleum products and nuclear fuel* (81.49%) and 35 *Manufacture of other transport equipment* (63.21%). Both of these industries were comparatively unattractive for foreign investors.

Table 3.3: Descriptive statistics of variables by branches

NCEA	Exports			FDI stock			Productivity			Unit labor costs			Investment		
	Avg. value	Std. Dev.	Avg. growth	Avg. value	Std. Dev.	Avg. FDI inflow	Avg. value	Std. Dev.	Avg. growth	Avg. value	Std. Dev.	Avg. growth	Avg. value	Std. Dev.	Avg. growth
15	438.83	46.00	1.63	116.65	71.26	28.74	103.21	9.48	3.58	89.01	5.70	-2.81	215.47	33.88	0.33
16	56.56	35.67	49.48	3.79	4.73	1.26	149.50	48.24	14.27	106.37	36.20	1.63	14.18	5.41	-12.51
17	201.43	51.85	9.36	4.19	4.02	1.70	189.76	66.09	22.59	81.56	9.12	-4.60	8.01	6.52	68.81
18	569.71	29.82	-1.87	2.39	1.21	0.59	95.26	3.05	-0.82	96.99	11.19	-2.71	19.11	6.90	12.97
19	244.33	15.94	-1.74	0.74	1.29	0.51	118.87	11.93	5.49	98.94	3.49	-0.53	4.65	1.98	15.62
20	246.25	28.45	3.77	5.19	1.97	0.65	122.48	13.25	6.41	91.69	6.53	-2.06	19.14	6.41	22.87
21	102.06	23.65	10.37	17.27	13.15	4.71	179.70	75.37	22.56	83.85	19.44	-5.56	31.28	16.58	24.49
22	35.25	15.81	30.12	26.03	17.98	6.06	229.11	120.65	34.48	106.22	8.28	0.87	38.45	15.21	25.94
23	422.38	63.12	3.26	0.00	0.00	0.00	107.31	13.22	4.04	97.84	16.12	4.40	25.73	21.01	81.49
24	639.78	46.64	0.56	652.11	246.87	116.11	122.06	18.39	7.77	66.88	15.31	-8.43	109.10	25.99	13.03
25	103.24	19.94	11.43	10.43	8.69	3.50	109.80	16.86	6.88	89.33	16.16	-6.35	20.75	5.73	12.31
26	209.49	59.36	12.06	269.26	157.66	65.22	131.41	33.70	12.00	86.09	14.33	-6.43	83.72	28.64	30.03
27	169.23	22.86	6.91	4.11	4.29	1.86	172.77	35.80	14.35	116.25	20.83	6.40	21.91	22.91	55.91
28	142.64	35.49	10.95	17.21	6.72	2.99	164.14	41.06	14.90	93.30	9.06	-3.80	28.27	10.74	38.45
29	238.84	62.76	12.53	14.63	9.53	3.34	144.49	52.81	18.24	113.45	16.57	0.90	15.35	4.05	12.59
31	280.96	43.26	6.24	44.14	12.28	5.76	116.26	28.75	11.00	110.66	11.35	0.54	21.66	6.85	16.94
32	139.45	59.67	23.03	43.47	3.78	2.10	76.34	14.41	-3.90	103.75	38.07	2.15	9.97	1.13	1.55
33	52.24	19.82	16.55	0.00	0.00	-0.02	215.07	67.63	23.11	64.99	20.88	-11.36	2.77	1.10	27.13
34	87.62	13.18	8.56	9.92	4.37	1.65	639.71	691.28	84.93	62.23	19.84	-7.85	6.61	3.13	26.92
35	824.37	369.48	57.60	5.78	7.47	1.92	155.57	43.97	15.77	83.88	10.27	-2.39	44.69	39.56	63.21
36	189.97	36.12	8.40	7.50	8.31	3.18	173.04	50.01	18.32	86.06	12.82	-6.13	16.95	4.19	5.95

Notes: Average value for exports, FDI stock and investment in Mio. USD. Average FDI inflow in Mio. USD. Average value for productivity and unit labor costs in index values. Average growth in % for all variables.

The correlation coefficients between all these variables and some others, relevant for the latter estimations are given in Table 3.4. The two variables with the highest correlation coefficient with the dependent variable in the latter estimations – exports, are domestic investment (0.342) and FDI stock (0.238). The coefficient between these two independent variables is rather high and amounts to 0.612. As for the other variables, productivity is relatively highly correlated with unit labor costs (-0.418), employment (-0.814) and the lagged change of employment (-0.382). The two employment variables are relatively strongly correlated with unit labor costs as well and the coefficients amount to 0.501 and 0.440. This is understandable and expected considering the construction of productivity and unit labor costs variables described above.

Table 3.4: Correlations

	FDI	Investment	Productivity	Unit labor costs	REER	Empl.	ΔEmpl.
Exports	0.238	0.342	-0.312	-0.151	0.060	0.131	0.043
FDI		0.612	-0.061	-0.303	0.205	0.060	0.019
Investment			-0.210	-0.092	-0.015	0.238	0.180
Productivity				-0.418	0.085	-0.814	-0.382
Unit labor costs					0.007	0.501	0.440
REER						-0.198	0.023
Employment							0.314

The following models will be estimated:

$$\ln EX_{jt} = \alpha_j + \beta_1 \ln PD_{jt} + \beta_2 \ln ULC_{jt} + \beta_3 \ln REER_t + \varepsilon_{jt} \quad (E1)$$

$$\ln EX_{jt} = \alpha_j + \beta_1 \ln PD_{jt} + \beta_2 \ln ULC_{jt} + \beta_3 \ln REER_t + \beta_4 \ln I_{j(t-1)} + \varepsilon_{jt} \quad (E2)$$

$$\ln EX_{jt} = \alpha_j + \beta_1 \ln PD_{jt} + \beta_2 \ln ULC_{jt} + \beta_3 \ln REER_t + \dots + \beta_5 \ln FDI_{j(t-1)} + \varepsilon_{jt} \quad (E3)$$

$$\ln EX_{jt} = \alpha_j + \beta_1 \ln PD_{jt} + \beta_2 \ln ULC_{jt} + \beta_3 \ln REER_t + \beta_4 \ln I_{j(t-1)} + \beta_5 \ln FDI_{j(t-1)} + \varepsilon_{jt} \quad (E4)$$

The dependent variable $\ln EX$ is natural logarithm of real exports. Independent variables in the first specification are the natural logarithms of productivity index $\ln PD$, of unit labor costs index $\ln ULC$ and of real effective exchange rate $\ln REER$. Subscript $j = 1 \dots 21$ denotes different branches and t stands for different years, ranging from 1996 to 2002. The fixed effects one way error component model is used for the estimation. The constant term α_j denotes the branch-specific fixed effects. Domestic investment ($\ln I$) and FDI stock ($\ln FDI$) variables, used separately in second and third model specifications (because of

relatively high correlation coefficient between these variables) and together in the fourth, enter the regression with a one year lag. This can be justified with the fact that some time is needed before the new investment becomes effective. In the case of FDI, using lagged values should help to alleviate a potential simultaneity problem between exports and FDI variables. Using FDI stock values instead of inflows should help in this respect as well. In addition, FDI stock should better capture the relevance of the presence of foreign capital in some branch which is important as a source of potential indirect effects described in chapter 2.⁶⁰ If one used only FDI inflow values, then there might be cases in which a substantial inflow took place at the beginning of the observed period, and was not followed by subsequent inflows. In this way the values of this variable would be zero for all the subsequent years thus neglecting the strong presence of the foreign capital already invested, which may be a source of potentially important side effects. There is a potentially important variable which is not included in the above model – the export markets. The reason for which it is left out is that it is very difficult to find a good proxy. Using the GDP growth of countries which are important export destinations turned out to be insignificant. The reason is that within this indicator, there may be quite different developments for single industries. The effects of this omitted variable are thus captured by the individual effects term α_j and the fact that this variable is omitted does not affect the consistency of the estimations.

The above model specifications are modifications and extensions of the models estimated at the aggregated, macroeconomic level in Sun (2001) and Zhang and Song (2000). Both of these papers use the natural logarithm of real exports as dependent variable and lagged logarithm of FDI stock variable. Sun (2001) also uses domestic investment, and both papers add exchange rate as independent variable as well. In this paper, productivity and unit labor costs variables are added because it is expected that they are a significant determinant of industries' export competitiveness.

Another potential problem is the possible simultaneous causal relationship between exports and productivity identified in international trade theory and tested in the previous literature (see e.g. Kunst and Marin 1989). In order to account for this possibility, instrumental variables were used instead of productivity variables. In the search for appropriate instruments using the employment variable turned out to be a good idea, since the earlier

⁶⁰ See section 2.5 of chapter 2 on model specification for more detailed explanation of this approach.

research concluded that most of productivity increases were due to a decreasing number of workers in the manufacturing industry (Nikić 2003). In addition, productivity could be increased through investment in new technology or some transfer of knowledge. This justifies using domestic and foreign investment variables as instruments for productivity, especially because Škudar (2004) finds that firms with foreign ownership managed to increase productivity at a higher rate than domestically owned enterprises. The following specifications will be tested in order to find appropriate instruments for productivity:

$$\ln PD_{jt} = \alpha_j + \beta_1 \ln EMP_{j(t-1)} + \varepsilon_{jt} \quad (P1)$$

$$\ln PD_{jt} = \alpha_j + \beta_1 \ln EMP_{j(t-1)} + \beta_2 \Delta EMP_{j(t-1)} + \varepsilon_{jt} \quad (P2)$$

$$\ln PD_{jt} = \alpha_j + \beta_1 \ln EMP_{j(t-1)} + \beta_2 \Delta EMP_{j(t-1)} + \beta_3 \ln I_{j(t-1)} + \varepsilon_{jt} \quad (P3)$$

$$\ln PD_{jt} = \alpha_j + \beta_1 \ln EMP_{j(t-1)} + \beta_2 \Delta EMP_{j(t-1)} + \dots + \beta_4 \ln FDI_{j(t-1)} + \varepsilon_{jt} \quad (P4)$$

$$\ln PD_{jt} = \alpha_j + \beta_1 \ln EMP_{j(t-1)} + \beta_2 \Delta EMP_{j(t-1)} + \beta_3 \ln I_{j(t-1)} + \beta_4 \ln FDI_{j(t-1)} + \varepsilon_{jt} \quad (P5)$$

In the above equations, $\ln EMP$ stands for the natural logarithm of the lagged value of the employment index, while the ΔEMP denotes a percentage change of the employment index in the previous period. All other variables are same as before. The results of all the estimations are presented and discussed in the next section.

3.4 Results

Table 3.5 contains the results of the one way error component fixed effects panel data estimations for models (E1) – (E4).⁶¹ In the first model specification all variables are significant at 1% level with predicted signs. Productivity increases, currency depreciation and fall in unit labor costs promote exports. Including domestic investment in the regression (model E2) does not change these results except by increasing the absolute value of the coefficient of unit labor costs. The investment variable does not turn out to be significant. In the third specification, FDI stock variable is included instead of domestic

⁶¹ Also the results of the random effects panel data estimations (given in the Appendix 3-B) are discussed here, but only shortly because they are only slightly different from the results of the fixed effects estimations. Nevertheless, this shows the robustness of the results to applying different methods.

investment. The new variable is significant at the 10% level, with a positive, but relatively low coefficient. Productivity remains highly significant, unlike unit labor costs.⁶²

Table 3.5: Results of fixed effects estimations I

Dependent variable: Exports				
Estimation method: Fixed Effects – OLS Estimation				
	Model (E1)	Model (E2)	Model (E3)	Model (E4)
Constant	-5.258** (2.416)	-4.780* (2.795)	-2.088 (3.129)	-0.718 (3.624)
Productivity	0.304*** (0.082)	0.314*** (0.087)	0.302*** (0.090)	0.176* (0.099)
Unit labor costs	-0.372*** (0.135)	-0.564*** (0.130)	-0.140 (0.165)	-0.305* (0.162)
REER	2.269*** (0.509)	2.303*** (0.579)	1.303* (0.685)	1.186 (0.777)
Investment	---	0.057 (0.039)	---	0.093* (0.052)
FDI	---	---	0.057* (0.030)	0.091** (0.035)
Observations	147	126	115	102
R ² _{adj}	0.45	0.48	0.45	0.48

Standard errors are in parentheses. ***, **, * indicate significance at the 1 percent, 5 percent and 10 percent levels, respectively.

The coefficient and significance of the real effective exchange rate is lower, and this variable is now significant only at the 10% level. Including the domestic investment and FDI variables together in the fourth model specification yields the following results: Productivity and unit labor costs are significant only at the 10% level, real effective exchange rate turns out not to be relevant, and both investment variables are significant and with positive coefficients – domestic investment at 10% and FDI at 5% level. These variables obviously “pick up” some of the influence of the variables in model (E1), but the results of the last specification must be taken with some caution because domestic investment and foreign direct investment variables, which have a relatively high simple correlation coefficient, enter the regression together. Despite this, there are no other usual symptoms of multicollinearity (as described e.g. in Pindyck and Rubinfeld 1998).

In order to check for the potential endogeneity of the productivity variable, possibly arising because of simultaneous causal relationship between productivity and exports (see Kunst

⁶² In the same specification, only without productivity variable, unit labor costs are significant at the 10% level, but the adjusted R² is much lower and amounts to 0.38.

and Marin 1989), models (P1) – (P5) are estimated in order to find appropriate instruments for productivity in the latter instrumental variables estimation. The results are presented in Table 3.6. As previously mentioned, the observed increases in the productivity of manufacturing industry are mostly due to cuts in the number of employees. Therefore, the first specification uses the lagged natural logarithm of the employment index. It is significant at the 1% level and the adjusted R^2 is 0.64. Adding the lagged growth of the employment variable (model P2) increases the explanatory power of the model (R^2 is equal to 0.71).

Table 3.6: Results for potential instruments of productivity variable

Dependent variable: Productivity					
Estimation method: Fixed Effects – OLS Estimation					
	Model (P1)	Model (P2)	Model (P3)	Model (P4)	Model (P5)
Constant	10.869*** (0.396)	11.163*** (0.363)	10.576*** (0.484)	10.921*** (0.754)	10.617*** (0.856)
Employment	-1.325*** (0.089)	-1.405*** (0.082)	-1.283*** (0.104)	-1.413*** (0.151)	-1.371*** (0.169)
Δ Employment	---	-0.917*** (0.174)	-0.928*** (0.172)	-0.723*** (0.195)	-0.781*** (0.190)
Investment	---	---	0.020 (0.032)	---	-0.026 (0.045)
FDI	---	---	---	0.046** (0.018)	0.074*** (0.024)
Observations	147	147	126	115	102
R^2_{adj}	0.64	0.71	0.62	0.67	0.65

Standard errors are in parentheses. ***, **, * indicate significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Domestic investment is added in the model (P3), but it turns out to be insignificant. The opposite is true for FDI stock (model P4), which positively and significantly influenced productivity. The R^2 of the fourth model is 0.67. In the fifth specification, with both investment variables, domestic investment remains insignificant, while the coefficient and the significance of FDI stock variable is increased. The explanatory power of the model is reduced relative to model P4. As a result, the variables in models P2 and P4 are chosen as the best candidates for the instruments of productivity variables in two step least square (2SLS) instrumental variables estimations.⁶³ The results of these regressions are presented

⁶³ In searching for the appropriate instruments of the productivity variable, specifications including real effective exchange rates were estimated as well under the assumption that exchange rate developments “forced” the enterprises to search for other ways of improving their export competitiveness i.e. to increase productivity (“productivity whip”). These results are not shown here because this variable always turned out to be insignificant for productivity.

in Table 3.7. The first two columns of Table 3.7 contain the results for model (E1), in which productivity is instrumented with two employment variables (model IV1 with P2), and with two employment variables and FDI stock (model IV2 with P4).

Table 3.7: Results of fixed effects estimations II

Dependent variable: Exports					
Estimation method: Fixed Effects – IV Estimation					
	Model (IV1 with P2)	Model (IV2 with P4)	Model (IV3 with P2)	Model (IV4 with P4)	Model (IV5 with P2)
Constant	-5.446** (2.433)	-5.366** (2.646)	-4.602 (2.813)	-5.899* (3.284)	-0.799 (3.816)
Productivity	0.214* (0.112)	0.353*** (0.111)	0.255** (0.122)	0.352*** (0.121)	0.183 (0.136)
Unit labor costs	-0.442*** (0.148)	-0.261 (0.167)	-0.603*** (0.142)	-0.366** (0.172)	-0.302* (0.168)
REER	2.472*** (0.539)	2.150** (0.546)	2.364*** (0.586)	2.279*** (0.670)	1.195 (0.789)
Investment	---	---	0.060 (0.040)	0.122** (0.053)	0.093* (0.052)
FDI	---	---	---	---	0.090** (0.038)
Observations	147	115	126	102	102
p-value	0.533	0.066	0.250	0.033	0.819
R ² _{adj}	0.44	0.43	0.48	0.43	0.48

Standard errors are in parentheses. ***, **, * indicate significance at the 1 percent, 5 percent and 10 percent levels, respectively.

The test of the joint null hypotheses that the equation is properly specified and the instruments are valid instruments (i.e. uncorrelated with the error term) was conducted. The p-values imply that using only employment variables as instruments is a better choice, i.e. the model is correctly specified and we cannot reject the null hypotheses of no correlation between the instruments and the errors in equation (E1). Comparison of these results with the results of the OLS estimates of model (E1) (Table 3.5) reveals that the significance and the coefficient of the productivity variable have decreased. Unit labor costs and real effective exchange rates remain significant at the 1% level. In the next step, model (E2) was estimated using only employment variables (model IV3 with P2) and using employment variables and FDI stock as instruments (model IV4 with P4). Again, p-values of test statistics speak in favor of using only employment variables as instruments. Compared to results from OLS estimations (model E2 in Table 3.5) the significance and the coefficient of the productivity variable are now lower. The last regression uses employment variables as instruments for productivity, but adds FDI stock as an

independent variable (model IV5 with P2). The results are very similar to the ones from the OLS estimation of model (E4) in Table 3.5, except that now productivity is insignificant.

Overall, one can make following conclusions: The positive and significant effect of FDI on exports seems to be quite robust, though with relatively small coefficient. A 1% increase in FDI stock leads to a 0.09% increase of exports. In addition, this effect seems to be captured by the productivity variable if FDI stock is left out of the regressions. That FDI positively influences productivity is in line with the findings from Škudar (2004). It seems likely that productivity was the channel through which FDI has contributed to better export performance. On the other hand, when productivity is instrumented with employment variables its impact on exports is insignificant when the impact of FDI variable is controlled for (model IV5 with P2). This implies that the productivity increases that were induced by employment cuts did not promote exports. On the other hand, unit labor costs turn out to be a relevant determinant of exports (except in model E3, Table 3.5). The initially significant results for the real effective exchange rate are weakened after introducing investment variables into the model (models E3, E4 and IV5 with P2). This may be due to loss of degrees of freedom. Also, the possibility of multicollinearity in the specifications with both investment variables cannot be excluded. It is very difficult to draw a clear conclusion about the effect of this variable on exports, especially since the effects of the changed imported input prices on exports may weaken the theoretically predicted influence of the exchange rate on exports. This has not been the primary goal of this paper, but the fact that real effective exchange rate did not have a very important impact on exports over the observed period is also in line with research results from Babić (2002) and Galinec and Jurlin (2002). Stučka (2004) finds only a limited positive impact of potential currency depreciation on Croatian trade balance. It must be stated here that for the model (IV5 with P2), this variable barely fails the 10% significance level limit (p-value of t-statistic is 0.13). The results for domestic investment are mixed and not very convincing for the fixed effects model. It is significant only at the 10% level after controlling for the FDI stock variable. But the results of the random effects model (Tables 3-B1 and 3-B2 in the Appendix 3-B) reveal the higher importance of this variable for exports.

3.5 Conclusions and policy recommendations

The exports of Croatian manufacturing industry have been stagnating over the last decade or so. Over the same period there have been relatively high inflows of foreign direct investment (FDI) into industry. The aim of this paper was to examine whether these inflows have had an impact on export performance, after controlling for other potentially significant variables. The panel data approach for 21 branches of the manufacturing industry over the period between 1996 and 2002 yields results which suggest a positive and statistically significant effect of foreign direct investment on exports mainly through productivity increases. Lower unit labor costs also significantly contributed to promoting exports. At the same time, it is difficult to draw clear conclusions about the role of real effective exchange rate development. Most specifications show a positive, strong and significant impact on exports, but this is weakened after including investment variables in the model. This may be due to loss of degrees of freedom in the specifications with more variables. However, the effects of changes of imported input prices due to exchange rate changes may weaken the theoretically predicted influence of the exchange rate on exports. In addition, considering the other potential adverse effects of currency devaluation on the economy, it seems that exchange rate policy cannot be used effectively for export promotion. For domestic investment results are mixed for the fixed effects specifications, but the results of the random effects model suggest a positive and significant effect of domestic investment on exports, though of a modest size. This implies that there may be some constraints to export expansion due to, either limited production capacity, or more likely, lack of modern production technology in Croatian manufacturing industry (or both).

The results of this study imply that inward FDI may help improve export performance. This calls for more active investment promoting policy measures. Also, there may be a potential for enhancing the potential positive effects of FDI by targeting specifically export-oriented foreign investment, and, in addition, implementing measures to increase potential spillover effects.⁶⁴ However, FDI promotion policy in Croatia has been inadequate. In an extensive study, Babić et al. (2001) analyze, among other things, the determinants of the attractiveness of Croatia for foreign investors and discuss the existing

⁶⁴ It is still possible to target export-oriented FDI despite some restrictions imposed by international agreements (see Section 2.7 of Chapter 2 for a more detailed discussion and also UNCTAD 2002, p. 203-213).

Law on Investment Promotion. Unfortunately, most of the drawbacks of the Law, as well as the other factors impeding more FDI inflows in Croatia emphasized in that study are still valid. The Croatian market is comparatively small, with a moderate consumption potential and high unemployment. Some positive developments in trade liberalization and integration with other markets have improved the Croatian position as a potential production location for export-oriented foreign investors. The public administration is still inefficient and corrupt, the judiciary is slow and, thus protection of property rights is inefficient. The relevant infrastructure is still underdeveloped despite large public investment in road building. The Law on Investment Promotion leaves lots of room for discretionary decisions increasing the uncertainty of the potential foreign investors regarding the expected treatment; it discriminates between domestic and foreign enterprises as well as between small and large companies, giving domestic and larger firms certain advantages. It also implies more favorable treatment of companies in certain industries, especially of labor force intensive production. Babić et al. (2001) also point out that the investment promotion activity has been very low and that the Law on Investment Promotion was more a matter of words on paper. In other words, they see its major purpose in gaining more political points for the coalition government from 2000 to 2004, while the actual political willingness for stronger FDI promotion is lacking.

While dealing with the above problems would certainly contribute to higher FDI inflows to Croatia, there are other measures as well which can be implemented additionally in order to magnify the potential positive spillover effects from foreign investment. Basically, host countries may condition FDI incentives on mandatory measures or use the incentives to encourage investors to behave in certain way (UNCTAD 2003, p. 87). For example, such performance requirements may include more extensive use of domestic inputs into production, training of local workers and technology transfers. An important aspect of the host countries' policies aiming at enhancing benefits from FDI is to strengthen the host countries' capabilities themselves. Only if the human capital in host countries is at sufficiently high level regarding the relevant skill is there an increased absorptive capacity for the knowledge spillovers disseminated by the foreign investors.

Appendix 3-A: Manufacturing industry by branches (NCEA)

D Manufacturing

- 15 Manufacture of food products and beverages
- 16 Manufacture of tobacco products
- 17 Manufacture of textiles
- 18 Manufacture of wearing apparel; dressing and dyeing of fur
- 19 Tanning, handbags, saddlery, harness and footwear
- 20 Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
- 21 Manufacture of pulp, paper and paper products
- 22 Publishing, printing and reproduction of recorded media
- 23 Manufacture of coke, refined petroleum products and nuclear fuel
- 24 Manufacture of chemicals and chemical products
- 25 Manufacture of rubber and plastic products
- 26 Manufacture of other non-metallic mineral products
- 27 Manufacture of basic metals
- 28 Manufacture of fabricated metal products, except machinery and equipment
- 29 Manufacture of machinery and equipment n.e.c.
- 31 Manufacture of electrical machinery and apparatus, n.e.c.
- 32 Manufacture of radio, television and communication equipment and apparatus
- 33 Manufacture of medical, precision and optical instruments, watches and clocks
- 34 Manufacture of motor vehicles, trailers and semi-trailers
- 35 Manufacture of other transport equipment
- 36 Manufacture of furniture; manufacturing, n.e.c.

Appendix 3-B: Random effects estimations

Table 3-B1: Results of random effects estimations I

Dependent variable: Exports				
Estimation method: Random Effects – GLS Estimation				
	Model (E1)	Model (E2)	Model (E3)	Model (E4)
Constant	-5.466** (2.495)	-4.793* (2.906)	-1.259 (3.230)	-0.035 (3.701)
Productivity	0.263*** (0.084)	0.252*** (0.088)	0.250*** (0.090)	0.129 (0.095)
Unit labor costs	-0.391*** (0.138)	-0.575*** (0.133)	-0.149 (0.167)	-0.325** (0.163)
REER	2.374*** (0.524)	2.369*** (0.601)	1.239* (0.689)	1.193 (0.776)
Investment	---	0.079** (0.039)	---	0.106** (0.051)
FDI	---	---	0.065** (0.029)	0.090*** (0.034)
Observations	147	126	115	102
R ² _{adj}	0.45	0.48	0.45	0.48

Standard errors are in parentheses. ***, **, * indicate significance at the 1 percent, 5 percent and 10 percent levels, respectively.

Table 3-B2: Results of random effects estimations II

Dependent variable: Exports		
Estimation method: Random Effects – IV Estimation		
	Model (IV1 with P2)	Model (IV5 with P2)
Constant	-5.653** (2.511)	-0.097 (3.827)
Productivity	0.172 (0.114)	0.137 (0.129)
Unit labor costs	-0.462*** (0.151)	-0.321* (0.167)
REER	2.579*** (0.554)	1.195 (0.776)
Investment	---	0.105** (0.051)
FDI	---	0.090** (0.036)
Observations	147	102
R ² _{adj}	0.44	0.48

Standard errors are in parentheses. ***, **, * indicate significance at the 1 percent, 5 percent and 10 percent levels, respectively.

References

- Aitken, B., Hanson, G.H. and Harrison, A.E. 1997, "Spillovers, foreign investment, and export behaviour", *Journal of International Economics* 43, pp. 103-132.
- Alam, M.I. 2003, "Manufactured Exports, Capital Good Imports, and Economic Growth: Experience of Mexico and Brazil", *International Economic Journal* 17, pp. 85-105.
- Altomonte, C. and Resmini, L. 2002, "Multinational Corporations as Catalyst for Industrial Development: The Case of Poland", *Italian Journal of Regional Science* 2, pp. 29-57.
- Babić, A. 2002, "Flatliners: The story of Croatian exports", paper presented at the conference: "International Conference of the Faculty of Economics Sarajevo ICES2002: Transition in Central and Eastern Europe – Challenges of 21st Century", October 2002, Sarajevo, published in conference proceedings.
- Babić, A., Pufnik, A. and Stučka T. 2001, "Teorija i stvarnost inozemnih izravnih ulaganja u svijetu i u tranzicijskim zemljama s posebnim osvrtom na Hrvatsku" (*Theory and reality of foreign direct investment in the world and in transition countries with special focus on Croatia*), Croatian National Bank, Pregledi P-9.
- Balaguer, J. and Cantavella, J. M. 2004, "Structural Change in Exports and Economic Growth: Cointegration and Causality Analysis for Spain (1961-2000)", *Applied Economics* 36, pp. 473-77.
- Barrios, S., Görg, H. and Strobl, E. 2003, "Explaining Firms' Export Behaviour: R&D, Spillovers and the Destination Market", *Oxford Bulletin of Economics and Statistics* 65, pp. 475-496.
- Barrios, S., Görg, H. and Strobl, E. 2005, "Foreign direct investment, competition and industrial development in the host country", *European Economic Review* 49, pp. 1761-1784.
- Barros, P.P. and Cabral, L. 2000, "Competing for Foreign Direct Investment", *Review of International Economics* 8, pp. 360-371.
- Barry, F. and Bradley J. 1997, "FDI and Trade: The Irish Host-Country Experience", *The Economic Journal* 107, pp. 1798-1811.
- Bayindir-Upmann, T. 1998, "Two Games of Interjurisdictional Competition When Local Governments Provide Industrial Public Goods", *International Tax and Public Finance* 5, pp. 471-487.

- Bejaković, P. and Lowther, J. (eds.) 2004, *Croatian Human Resource Competitiveness Study*, Zagreb: Institute of Public Finance.
- Beko, J. 2003, "Causality Analysis of Exports and Economic Growth: Aggregate and Sectoral Results for Slovenia", *Eastern European Economics* 41, pp. 70-92.
- Bevan, A.A. and Estrin, S. 2004, "The Determinants of Foreign Direct Investment in Transition Economies", *Journal of Comparative Economics* 32, pp. 775-87.
- Bjorvatn, K. and Eckel, C. 2006, "Policy competition for foreign direct investment between asymmetric countries", *European Economic Review* 50, pp. 1891-1907.
- Black, D.A. and Hoyt, W.H. 1989, "Bidding for Firms", *The American Economic Review* 79, pp. 1249-1256.
- Blomström, M. 1991, "Host Country Benefits of Foreign Direct Investment", in: McFetridge, D. (ed.), *Foreign Investment, Technology and Economic Growth*, Calgary University Press.
- Blomström, M. and Kokko, A. 1998, "Multinational Corporations and Spillovers", *Journal of Economic Surveys* 12, pp. 247-277.
- Blomström, M. and Kokko, A. 2003, "The Economics of Foreign Direct Investment Incentives", NBER Working Paper No. 9489.
- Bond, E.W. and Samuelson, L. 1986, "Tax Holidays as Signals", *The American Economic Review* 76, pp. 820-826.
- Brander, J.A. and Spencer, B.J. 1987, "Foreign Direct Investment with Unemployment and Endogenous Taxes and Tariffs", *Journal of International Economics* 22, pp. 257-279.
- Breuss, F. 2003, *Reale Außenwirtschaft und Europäische Integration*, Frankfurt am Main: Peter Lang.
- Breuss, F., Egger, P. and Pfaffermayr, M. 2001, "The impact of Agenda 2000's structural policy reform on FDI in the EU", *Journal of Policy Modeling* 23, pp. 807-820.
- Breuss, F., Egger, P. and Pfaffermayr, M. 2003, "Structural funds, EU enlargement, and the redistribution of FDI in Europe", WIFO Working Papers No. 195/2003.
- Bucovetsky, S. 1991, "Asymmetric Tax Competition", *Journal of Urban Economics* 30, pp. 167-181.
- Bucovetsky, S. 2005, "Public input competition", *Journal of Public Economics* 89, pp. 1763-1787.
- Campos, N.F. and Kinoshita, Y. 2002, "Foreign direct investment as technology transferred: Some panel evidence from the transition economies", *The Manchester School* 70, pp. 398-419.

- Carstensen, K. and Toubal, F. 2004, "Foreign direct investment in Central and Eastern European countries: a dynamic panel analysis", *Journal of Comparative Economics* 32, pp. 3-22.
- Coughlin, C.C. and Segev, E. 2000, "Location determinants of new foreign-owned manufacturing plants", *Journal of Regional Science* 40, pp. 323-351.
- Cuaresma, J.C. and Wörz, J. 2005, "On exports composition and growth", *Review of World Economics/ Weltwirtschaftliches Archiv* 141, pp. 33-49.
- Djankov, S. and Hoekman, S. 1996, "Intra-Industry Trade, Foreign Direct Investment, and the Reorientation of Eastern European Exports", Policy Research Working Paper No. 1652, The World Bank.
- Djankov, S. and Hoekman, S. 2000, "Foreign Investment and Productivity Growth in Czech Enterprises", *The World Bank Economic Review* 14, pp. 49-64.
- Dritsaki, M. and Adamopoulos, A. 2003, "Exports and Economic Growth in Less Developing Countries of the European Union", *International Review of Economics and Business* 50, pp. 249-57.
- Dunning, J.H. 1993, *Multinational Enterprises and the Global Economy*, Addison-Wesley Publishing Company.
- Ekholm, K., Forslid, R. and Markusen, J.R. 2003, "Export-Platform Foreign Direct Investment", NBER Working Paper No. 9517.
- Eurostat 2005a, "GDP per capita varied by one to five across the EU25 Member States", Eurostat news release, 75/2005.
- Eurostat 2005b, "Regional unemployment rates in the EU25 ranged from 2.4% to 32.8% in 2004", Eurostat news release, 126/2005.
- Feenstra, R.C. 2004, *Advanced International Trade: Theory and Evidence*, Princeton and Oxford: Princeton University Press.
- Fumagalli, C. 2003, "On the welfare effects of competition for foreign direct investments", *European Economic Review* 47, pp. 963-983.
- Galinec, D. and Jurin, K. 2002, "Kako potaknuti hrvatski robni izvoz nakon višegodišnje stagnacije?" (*How to promote Croatian exports of goods after years of stagnation?*), paper presented at the 1. conference of "Ekonomija moderna": "Odnos države i tržišta na putu integracije Hrvatske u svjetske gospodarske tokove" (*Relationship between state and market on the road of integration of Croatia in the world economy*), Zagreb, October 2002.

- Garibaldi, P., Mora, N., Sahay, R. and Zettelmeyer, J. 2002, "What Moves Capital to Transition Economies?", IMF Working Paper WP/02/64.
- Girma, S., Kneller, R. and Pisu, M. 2007, "Do exporters have anything to learn from foreign multinationals?", *European Economic Review* 51, pp. 981-998.
- Goldberg, L.S. and Klein, M.W. 2000, "International Trade and Factor Mobility: An Empirical Investigation", in Calvo, G., R. Dornbusch, and M. Obstfeld (eds.), *Festschrift in Honor of Robert Mundell*, Cambridge: MIT Press.
- Görg, H. and Greenaway, D. 2004, "Much Ado About Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment?", *World Bank Research Observer* 19, pp. 171-197.
- Görg, H. and Strobl, E. 2001, "Multinational Companies and Productivity Spillovers: A Meta-Analysis", *The Economic Journal* 111, pp. F723-F739.
- Green, W.H. 2000, *Econometric Analysis*, Prentice Hall.
- Haaland, J.I. and Wooton, I. 1999, "International Competition for Multinational Investment", *Scandinavian Journal of Economics* 101, pp. 631-649.
- Haaparanta, P. 1996, "Competition for foreign direct investment", *Journal of Public Economics* 63, pp. 141-153.
- Haufler, A. 2001, *Taxation in a global economy*, Cambridge Univ. Press.
- Haufler, A. and Wooton, I. 1999, "Country size and tax competition for foreign direct investment", *Journal of Public Economics* 71, pp. 121-139.
- Helpman, E. 2006, "Trade, FDI and Organization of Firms", NBER Working Paper No. 12091.
- Helpman, E. and Krugman, P.R. 1985, *Market Structure and Foreign Trade*, Cambridge: MIT Press.
- Helpman, E., Melitz, M.J. and Yeaple, S.R. 2004, "Export Versus FDI with Heterogeneous Firms", *American Economic Review* 94, pp. 300-316.
- Horstmann, I.J., and Markusen, J.R. 1992, "Endogenous market structures in international trade (natura facit saltum)", *Journal of International Economics* 32, pp. 109-129.
- IMF, 1996, *Balance of Payments Textbook*, Washington D.C: International Monetary Fund.
- IMF, 2003, *International Financial Statistics*, Washington D.C: International Monetary Fund.
- Janeba, E. 1998, "Tax competition in Imperfectly Competitive Markets", *Journal of International Economics* 44, pp. 135-153.

- Janeba, E. 2002, "Attracting FDI in a politically risky world", *International Economic Review* 43, pp. 1127-1155.
- Jensen, C. 2002, "Foreign Direct Investment, Industrial Restructuring and the Upgrading of Polish Exports", *Applied Economics* 34, pp. 207-217.
- Keen, M. and Marchand, M. 1997, "Fiscal competition and the pattern of public spending", *Journal of Public Economics* 66, pp. 33-53.
- King, I.R., McAfee, R.P. and Welling, L. 1993, "Industrial Blackmail: Dynamic Tax Competition and Public Investment", *The Canadian Journal of Economics* 26, pp. 590-608.
- Kokko, A. 2002, "Export-Led Growth in East-Asia: Lessons for Europe's Transition Economies", The European Institute of Japanese Studies Working Paper Series No. 142.
- Krkoska, L. 2001, "Foreign direct investment financing of capital formation in central and eastern Europe", EBRD Working Paper No. 67.
- Kumar, A. and Zajc, K. 2003, "Foreign Direct Investment's Impact on Host-Country Export Performance Tested on Industry-Level Panel Data for Slovenia", in: *Fifth International Conference on "Enterprise in Transition"*, pp. 1222-1233, Split, Croatia.
- Kunst, R. and Marin, D. 1989, "On Exports and Productivity: A Causal Analysis", *The Review of Economics and Statistics* 71, pp. 699-703.
- Lipschitz, L., Lane, T., and Mourmouras, A. 2002, "Capital Flows to Transition Economies: Master or Servant?", IMF Working Paper WP/02/11.
- Lipsey, R.E. 2002, "Home and host country effects of FDI", NBER Working Paper No. 9293.
- Lucas, R.E. 1990, "Why Doesn't Capital Flow from Rich to Poor Countries", *American Economic Review* 80, pp. 92-96.
- Makino, S., Beamish, P.W. and Bin Zhao, N. 2004, "The characteristics and performance of Japanese FDI in less developed and developed countries", *Journal of World Business* 39, pp. 377-392.
- Markusen, J.R. 1995, "The Boundaries of Multinational Enterprises and the Theory of International Trade", *The Journal of Economic Perspectives* 9, pp. 169-189.
- Markusen, J.R. 2002, *Multinational Firms and the Theory of International Trade*, Cambridge: MIT Press.
- Markusen, J.R. 2005, "Modeling the Offshoring of White-Collar Services: From Comparative Advantage to the New Theories of Trade and FDI", NBER Working Paper No. 11827.

- Markusen, J.R. and Venables, A.J. 1998, "Multinational firms and the new trade theory", *Journal of International Economics* 46, pp. 183-203.
- Markusen, J.R. and Venables, A.J. 1999, "Foreign direct investment as a catalyst for industrial development", *European Economic Review* 43, pp. 335-356.
- Markusen, J.R. and Venables, A.J. 2000, "The Theory of Endowment, Intra-Industry and Multinational Trade", *Journal of International Economics* 52, pp. 209-234.
- Markusen, J.R., Morey, E.R. and Olewiler, N. 1995, "Competition in regional environmental policies when plant locations are endogenous", *Journal of Public Economics* 56, pp. 55-77.
- Martin, P. and Rogers, C.A. 1995, "Industrial Location and Public Infrastructure", *Journal of International Economics* 39, pp. 335-351.
- Matsumoto, M. 1998, "A note on tax competition and public input provision", *Regional Science and Urban Economics* 28, pp. 465-473.
- Medina-Smith, E. 2001, "Is the export-led growth hypothesis valid for developing countries? A case study of Costa Rica", UNCTAD, Policy issues in international trade and commodity study series, No. 7, Geneva.
- Melitz, M. 2003, "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity", *Econometrica* 71, pp. 1695-1725.
- Mencinger, J. 2003, Does Foreign Direct Investment Always Enhance Economic Growth?, *Kyklos* 56, pp. 493-510.
- Morisset, J. and Pirnia, N. 1999, "How Tax Policy and Incentives Affect Foreign Direct Investment", The World Bank, Policy Research Working Paper Series No. 2509.
- Mundell, R.A. 1957, "International Trade and Factor Mobility", *The American Economic Review* 47, pp. 321-335.
- Nikić, G. 2003, *Tranzicija u Hrvatskoj: Deset godina stabilnosti tečaja i cijena, (Transition in Croatia: Ten years of exchange rate and price stability)*, Zagreb: Ekonomski institut and Binoza Press.
- OECD 2003, *Checklist for Foreign Direct Investment Incentive Policies*, Paris, OECD.
- Oman, C. 2000, *Policy Competition for Foreign Direct Investment*, Development Centre Studies: International Development, OECD.
- Pinyck, R.S. and Rubinfeld, D.L. 1998, *Econometric Models and Economic Forecasts*, McGraw-Hill International Editions.
- Pöschl, J. et al. 2002, "Transition Countries Face Up to Global Stagnation: Is it Catching?", WIIW Research Report No. 283.

- Prucha, I.R. 2002, "Estimation of Panel Data Models", Draft.
- Repkine, A. and Walsh, P. 1998, "European trade and foreign direct investment U-shaping industrial output in central and eastern Europe – theory and evidence", IMF Working Paper WP/98/150.
- Resmini, L. 2000, "Determinants of foreign direct investment in the CEECs: New evidence from sectoral patterns", *Economics of Transition* 8, pp. 665-689.
- Samuelson, P.A. 1948, "International Trade and Equalization of Factor Prices", *The Economic Journal* 58, pp. 163-184.
- Samuelson, P.A. 1949, "International Factor Price Equalization Once Again", *The Economic Journal* 59, pp. 181-197.
- Schürmann, C. and Talaat, A. (2000), *Towards a European Peripherality Index. Final Report*, Report for General Directorate XVI Regional Policy of the European Commission. Dortmund: IRPUD.
- Škudar, A. 2004, "Pregled i analiza izravnih ulaganja u Republiku Hrvatsku" (*Survey and analysis of direct investment in Republic of Croatia*), Croatian National Bank, Pregledi P-16.
- Stučka, T. 2004, "The Effects of Exchange Rate Changes on the Trade Balance in Croatia", IMF Working Paper No. WP/04/65.
- Sun, H. 2001, "Foreign Direct Investment and Regional Export Performance in China", *Journal of Regional Science* 41, pp. 317-336.
- Švigir, M. 2004, "Structural aspects of labor force cost competitiveness among employees in Croatia's manufacturing industry", in: Bejaković, P. and Lowther, J. (eds.), *Croatian Human Resource Competitiveness Study*, Zagreb: Institute of Public Finance.
- UN/ECE 2000, FDI and the Macroeconomy in the Transition Economies, Background paper by the Economic Analysis Division for the UN/ECE Regional Conference "Financing for Development".
- UNCTAD 1996, *Incentives and Foreign Direct Investment*, New York and Geneva: United Nations.
- UNCTAD 2001, *World Investment Report: Promoting Linkages*, New York and Geneva: United Nations.
- UNCTAD 2002, *World Investment Report: Transnational Corporations and Export Competitiveness*, New York and Geneva: United Nations.
- UNCTAD 2003, *Handbook of Statistics*, available at: www.unctad.org.

- UNCTAD 2003, *World Investment Report: FDI Policies for Development: National and International Perspectives*, New York and Geneva: United Nations.
- Walz, U. and Wellisch, D. 1996, "Strategic Provision of Local Public Inputs for Oligopolic Firms in the Presence of Endogenous Location Choice", *International Tax and Public Finance* 3, pp. 175-189.
- WIIW 2003, *Handbook of Statistics: Countries in Transition 2002*, Vienna.
- Wilson, J.D. 1991, "Tax Competition with Interregional Differences in Factor Endowments", *Regional Science and Urban Economics* 21, pp. 423-452.
- Wilson, J.D. 1999, "Theories of Tax Competition", *National Tax Journal* 52, pp. 269-304.
- Wilson, J.D. and Wildasin, D.E. 2004, "Capital tax competition: bane or boon", *Journal of Public Economics* 88, pp. 1065-1091.
- Wooldridge, J.M. 2002, *Econometric Analysis of Cross Section and Panel Data*, Cambridge: MIT Press.
- Zhang, K.H. and Markusen, J.R. 1999, "Vertical Multinationals and Host-Country Characteristics", *Journal of Development Economics* 59, pp. 233-252.
- Zhang, K.H. and Song, S. 2000, "Promoting Exports: The Role of Inward FDI in China", *China Economic Review* 11, pp. 385-96.
- Zodrow, G. and Mieszkowski, P. 1986, "Pigou, Tiebout, property taxation, and the underprovision of local public goods", *Journal of Urban Economics* 19, pp. 356-370.

Zusammenfassung

Die vorliegende Dissertation beinhaltet drei getrennte Aufsätze über ausländische Direktinvestitionen, in drei Kapiteln. Im ersten Kapitel befindet sich ein theoretischer Aufsatz über den Wettbewerb für ausländische Direktinvestitionen zwischen Ländern mit unterschiedlichem Entwicklungsstand. Die Frage die dieses Kapitel zu beantworten versucht ist wie ein weniger entwickeltes Land in dieser Art des Wettbewerbs gewinnen kann. Es wird angenommen, dass heimische Unternehmen im höher entwickelten Land mehr Kapital in der Produktion verwenden und, dass die Löhne im weniger entwickelten Land niedriger sind. Die Arbeit modelliert explizit die empirische Beobachtung, dass Länder im Wettbewerb für ausländische Direktinvestitionen dazu neigen, neben (oder statt) dem Anbieten von Subventionen oder Steuererleichterungen für ausländische Investoren, öffentliche Inputs bereitzustellen. Während nur das ausländische Unternehmen von Steuererleichterungen profitiert, erhöhen die zusätzlichen öffentlichen Inputs auch die Produktion der heimischen Unternehmen. Die Ergebnisse zeigen, dass wenn die Regierungen der Länder die im Wettbewerb stehen zwischen heimischen und ausländischem Unternehmen nicht diskriminieren dürfen, es Situationen geben kann in welchen das weniger entwickelte Land die ausländische Direktinvestition anzieht, abhängig von der Differenz der Arbeitskosten und der Empfindlichkeit der ausländischen und heimischen Unternehmen auf der Änderung des Angebots der öffentlichen Inputs. Darüber hinaus kann das Einbeziehen der öffentlichen Inputs in das Model das Ergebnis im Vergleich zum Einbezug einer anderen Standortdeterminante, welche durch die öffentlichen Maßnahmen nicht beeinflusst wird, verändern. Es gibt Situationen in welchen das Einbeziehen der öffentlichen Inputs die Chancen des weniger entwickelten Landes die Investition zu bekommen, erhöhen wird. Wenn die Steuerdiskriminierung zwischen den heimischen und ausländischen Unternehmen erlaubt ist, werden beide Länder das Angebot an öffentlichen Inputs auf das Optimum erhöhen, jedoch wird das Land auf dem höheren Entwicklungsstand immer die ausländische Investition anziehen.

Das zweite und das dritte Kapitel beinhalten empirische Arbeiten die untersuchen ob die Zuflüsse der ausländischen Direktinvestitionen die Exporte des Empfängerlandes erhöhen. Das zweite Kapitel überprüft diese Beziehung für 14 Transformationsländer in Zentral- und Osteuropa, über den Zeitraum von 1993 bis 2001. Es ist bekannt, dass neben den

direkten Auswirkungen der ausländischen Investitionen auf die Exportleistung, durch die Exporte der Niederlassungen der multinationalen Unternehmen, es auch mögliche indirekte Auswirkungen der ausländischen Direktinvestitionen auf das Empfängerland gibt und daher auch möglicherweise auf die Exporte heimischer Unternehmen, beispielsweise durch Technologie- und Wissenstransfer. Es gab bis jetzt keine Studie für diese Länder auf dem aggregierten, makroökonomischen Niveau, welche die gesamten, sowohl direkten als auch indirekten, Auswirkungen der ausländischen Direktinvestitionen gleichzeitig behandelt. Die Ergebnisse zeigen, dass neben den realen effektiven Wechselkursen und Entwicklungen auf den Exportmärkten, ausländische Direktinvestitionen eine signifikante Determinante der Exportleistung für das ganze Sample, wie auch für zwei Subsample in verschiedenen Modellspezifikationen, waren.

Das dritte Kapitel ist eine Verfeinerung der Analyse des zweiten Kapitels. Es verwendet Sektordaten um die Beziehung zwischen den Zuflüssen der ausländischen Direktinvestitionen und den Exporten der kroatischen verarbeitenden Industrie zu untersuchen. Die Exporte der kroatischen verarbeitenden Industrie sind in den letzten Jahrzehnten stagniert. Über denselben Zeitraum gab es relativ hohe Zuflüsse ausländischer Direktinvestitionen in die Industrie. Durch verwenden eines Panel Daten Ansatzes für 21 Branchen der verarbeitenden Industrie über die Periode zwischen 1996 und 2002, wurde herausgefunden, dass ausländische Direktinvestitionen einen positiven und statistisch signifikanten Einfluss auf die Exporte hatten: eine einprozentige Erhöhung des Bestandes an ausländischen Direktinvestitionen führte zu einer Erhöhung der Exporte von 0.09%. Das impliziert, dass es eine Möglichkeit gibt, die Exportleistung der kroatischen verarbeitenden Industrie durch das Anziehen von zusätzlichen ausländischen Direktinvestitionen in diesen Sektor zu verbessern. Die Entscheidungsträger sollten versuchen mögliche positive Auswirkungen ausländischer Investitionen zu erhöhen, indem gezielt spezifische export-orientierte Investitionen gesucht werden, und, zusätzlich Maßnahmen zur Steigerung möglicher indirekter Auswirkungen implementiert werden.

Curriculum Vitae

Name: Goran Vukšić
Date of birth: June 17th 1975.
Place of birth: Split, Croatia.
Citizenship: Croatian.

Present position: Research Assistant, Institute of Public Finance, Zagreb (since February 2005).
Fields of interest: International economics, public finance, applied econometrics.
Languages: Croatian (native speaker), English and German (fluent).

Education:

Since 2001: Doctoral Program in Economics, University of Vienna.
Thesis title: "Essays on Foreign Direct Investment".
Advisors:
Prof. Gerhard Clemenz (University of Vienna),
Prof. Fritz Breuss (University of Economics and Business Administration, Vienna).

2000 – 2002: Postgraduate Program in Economics.
Institute for Advanced Studies (IHS), Vienna.

1994 – 2000: Study of Economics, University of Economics and Business Administration, Vienna.
Degree: Mag. rer.soc.oec.
Master's thesis: "Capital flight from transition countries".
Advisor:
Prof. Brigitte Unger (University of Economics and Business Administration, Vienna).

Past positions:

2004 – 2005: Representative of Croatian Investment Promotion Alliance in MIGA office in Vienna (November 2004 – February 2005).
2003 – 2004: Research Assistant, Institute of Public Finance, Zagreb.
2002 – 2003: Research Assistant, University of Economics and Business Administration, Vienna, Europe Institute.
Project:
EU integration and regional economic development: Prospects for Central and Eastern Europe.

Other related work:

- 2006: Research project: "Analysis of adjustments of Value Added Tax exemptions in Croatia with *acquis communautaire* of the European Union", for Croatian Central Office of the Tax Administration.
- 2006: Local expert on CARDS project: "Development of the Business and Investment Climate in Croatia" – Implementation of "Investment Certification Programme for Regions".
- 2005: Work on "Guide for Foreign Investors", for Croatian Trade and Investment Promotion Agency.
- 2005: Part-time work for Croatian Central State Office for Development Strategy on Foreign Direct Investment related policy.

Publications:

Articles and working papers:

Kutan, A.M. and Vukšić, G. (2007), Foreign Direct Investment and Export Performance: Empirical Evidence, **Comparative Economic Studies**, Vol. 49 (3), pp. 430-445.

Tondl, G. and Vukšić, G. (2007), Catching up of Eastern European regions: The role of foreign investment, human resources and geography, in Eisen, R., Díaz Cafferata, A.M., Neder, A.E. and Recalde, M.L. (eds.): **Trade, Integration and Institutional Reforms in Latin America and the EU**, Peter Lang Frankfurt.

Fink, G., Haiss, P. and Vukšić, G. (2006), Importance of Financial Sectors for Growth in Accession Countries, in Liebscher, K., Christl, J., Mooslechner, P. and Ritzberger-Grünwald, D. (eds.): **Financial Development, Integration and Stability – Evidence from Central, Eastern and South-Eastern Europe**, Edward Elgar Publishing.

Vukšić, G. (2005), Impact of Foreign Direct Investment on Croatian Manufacturing Exports, **Financial Theory and Practice**, Vol. 29 (2), pp. 131-158.

Fink, G., Haiss, P. and Vukšić, G. (2004), Changing Importance of Financial Sectors for Growth from Transition to Cohesion and European Integration, **EI Working Paper** No. 58, Europe Institute, University of Economics and Business Administration, Vienna.

Tondl, G. and Vukšić, G. (2003), What makes regions in Eastern Europe catching up? The role of foreign investment, human resources and geography, **EI Working Paper** No. 51, Europe Institute, University of Economics and Business Administration, Vienna.

Vukšić, G. (2001), The flight of capital from Croatia: causes and extent, **Financial Theory and Practice**, Vol. 25 (4), pp. 459-485, (only in Croatian language).

Book reviews:

Vukšić, G. (2006), Missing link: how to integrate the development of capital markets and economic growth, Velimir Šonje (ed.), book review in: **Financial Theory and Practice**, Vol. 30 (3), 301-304.

Vukšić, G. (2004), Transition in Croatia: Ten years of price and exchange rate stability, Gorazd Nikić, 2003, book review in: **Financial Theory and Practice**, Vol. 28 (4), pp. 505-509, (in Croatian language).

Vukšić, G. (2001), *The Celtic Tiger – Ireland’s economic miracle explained*, Paul Sweeney, 1998, book review in: **Financial Theory and Practice**, Vol. 25 (4), pp. 641-647, (in Croatian language).

International conferences and presentations:

February 2007 – VIIIth Doctoral Meetings in International Trade and International Finance, Rennes, presentation: “*On Fiscal Policy in Competition for Foreign Direct Investment: When Does a Less Developed Country Win?*”.

September 2006 – General Directorate Economic and Financial Affairs Workshop on: Corporate tax competition and coordination in Europe, Brussels.

July 2006 – The 12th Dubrovnik Economic Conference (Croatian National Bank), Dubrovnik, presentation: “*Foreign Direct Investment and Export Performance of the Transition Countries in Central and Eastern Europe*”.

December 2005 – XIV International “Tor Vergata” Conference on Banking and Finance, Rome, presentation: “*Changing Importance of Financial Sectors for Growth from Transition to Cohesion and European Integration*”.

November 2005 – Conference on European Economic Integration: Financial Development, Integration and Stability in Central, Eastern and South-Eastern Europe (European Central Bank, Center for Financial Studies, Oesterreichische National Bank), Vienna, Presentation: “*Importance of Financial Sectors for Growth in Accession Countries*”.

July 2005 – VII World Congress of International Council for Central and East European Studies (ICCES), Berlin, Presentation: “*Importance of Financial Sectors for Growth in Accession Countries*”.

June 2005 – International Conference on Policy Modeling (EcoMod 2005), Istanbul, Presentation: “*Importance of Financial Sectors for Growth in Accession Countries*”.

May 2004 – Annual Meeting of the Austrian Economic Association (NOeG), Vienna, Presentation: “*What makes regions in Eastern Europe catching up? The role of foreign investment, human resources and geography*”.

April 2004 – IXth Spring Meeting of Young Economists, Warsaw, Presentation: “*Foreign Direct Investment and Export Performance of the Transition Countries in Central and Eastern Europe*”.