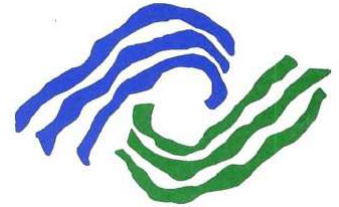




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~ ABSTRACT ~

FOREIGN DIRECT INVESTMENT, TECHNOLOGY TRANSFER AND ECONOMIC GROWTH IN CENTRAL AND EASTERN EUROPE

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Key words : foreign direct investment, technology transfer, spillovers, total factor productivity, economic growth, dynamic panel, simultaneous equations

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MOTIVATION

Debates on foreign direct investment, both in academia and the public space, associate these flows with a series of benefits for the host country. Foreign direct investment (FDI) is all the more desired in developing countries as it is seen as a factor of economic growth, additional to domestic investment and a source of financing current account deficit. The main stake is not centered on the direct effects, but it is especially concerned by the indirect effects that FDI can generate in the local economy. We can mention here technological spillovers, human capital formation or access to foreign markets. These are elements that appear in the new growth theory as conducive to long-term growth.

Countries of Central and Eastern Europe had a past of industrialized countries were confronted after the fall of Communism with an obsolete capital stock. The technology gap and the need for restructuring have required considerable effort to modernize and replace old structures. Starting the transition process with a large gap towards the global technological frontier, these countries are particularly concerned by technology transfer.

Most innovation and new technologies are created in developed countries. The only chance for developing countries is to import this technology, in one way or another. Due to financial constraints, the formal technology transfer appears to be too expensive for these countries. More viable options in terms of costs would be international trade and FDI. However, statistics show that imports of machinery and equipment are negligible in the international trade of Eastern European countries (0.01-0.02% of GDP). This makes us think of FDI as the main channel for technology transfer. This direction is also justified by the fact that about 70% of research and development expenditures at world level are concentrated in a small number of multinational companies.

The increased interest in FDI spillovers seems to be explained by the increase in flows towards host countries, with a peak in 2007 (\$1.9 billion according to the World Bank). However, the majority of flows are not directed towards the countries that have the greatest potential for benefits. Indeed, statistics show that developed countries are those that capture the most of FDI flows. In the recent decade, developing countries have begun to make up the gap in terms of FDI growth rate. Therefore, we naturally wonder whether the focus on FDI

and their spillovers is not disproportionate to their actual impact? Are spillovers significant enough to justify the subsidies and tax incentives implemented by developing countries to attract foreign investors?

Developing countries in general, and CEE in particular, have created numerous measures to attract foreign investors. Seen as a universal panacea and a miracle solution to the problems of transition, FDI flows were particularly encouraged. In 2007, when global capital flows were at their peak, the transition economies were the second most important destination for foreign investors, after emerging Asia. According to the World Bank (2006), FDI flows into Central and Eastern Europe have led to significant technological changes and management improvements, which have substantially affected the local economic environment.

Literature considers the technology transfer associated with capital flows as the main channel through which FDI contributes to economic development in host countries (Keller, 2009, Lipsey, 2004; DeMello, 1997, Campos and Kinoshita, 2002, Bloningen and Wang, 2004). Thus, even without any contribution to capital accumulation, FDI should stimulate technical progress by the transfer of technology and knowledge. If theoretical arguments are obvious, the lack of sound empirical evidence is surprising. Despite the relative consensus that foreign companies benefit from a direct technology transfer from the parent, there are no clear indications about the second order effects on domestic firms. Though a general positive effect is expected, it is possible for increased competition to compensate technological spillovers, leading to an overall neutral or even negative effect.

The recent availability of plant level datasets has enabled the development of microeconomic research on the mechanisms of technology transfer. New empirical studies focus on intra and inter-industry spillovers and often get conflicting results. The heterogeneity of countries, sectors and especially local firms explain most of these findings. Therefore, we cannot state a general conclusion. Expectations about the overall effect of FDI on the host economy remain ambiguous.

In examining the role of FDI in economic growth, despite convincing theoretical arguments, empirical results are far from optimistic. Macroeconomic studies analyzing the impact of FDI on growth revealed the presence of structural factors conditioning the impact (Borenztein et al., 1998, Alfaro et al., 2004 Balasubramanyan et al. 1996). A similar idea seems to emanate from microeconomic studies, prompting economists to question the existence of factors that facilitate and maximize positive FDI spillovers (Javorcik and Spatareanu, 2008, Nicolini and

Resmini, 2010). Although macro-economic policies of attracting foreign investors are based on the idea of technological spillovers, empirical studies show that the effect is not always positive and is subject for debate. The trade-off between the funds and effort spent to attract FDI, on the one hand, and benefits incurred, on the other hand, is far from being settled.

A technical argument that might explain the inconclusive results obtained so far is the endogeneity of FDI. Most studies omit the fact that the relationship between economic growth and FDI could be bidirectional. In the absence of appropriate methodologies, this makes the interpretation of results very difficult. Is foreign investment causing growth or is it growth that attracts investors because of expected profitability?

Certainly, FDI has positive effects in host country, but we wonder about overstating the benefits at the expense of adverse effects that may appear. The ambiguous results obtained from the literature point to a rather pessimistic conclusion, which does not seem to justify public funds mobilized to attract foreign investors. We therefore decided to conduct a quantitative study on FDI technological spillovers, both at micro and macro level, and identify conditions favoring a positive overall effect.

LITERATURE REVIEW

In this section we summarize the main strands of literature on FDI, technology transfer and economic growth. The theoretical and empirical literatures on technological spillovers have developed rather independently. There is thus a significant gap between the few theoretical research and the many empirical studies. In addition, the findings of the two strands of literature are not fully convergent. Although theoretical studies provide many arguments in favor of a positive effect of FDI on the technological level and local economic growth, empirical results are often inconclusive.

In terms of theoretical models, the main contributions come from of Markusen and Venables (1999), Alfaro and Rodriguez-Clare (2004) and Keller and Yeaple (2009). These studies see direct investment as an alternative to exporting. In certain circumstances, multinationals prefer to serve the local market by creating their local subsidiaries instead of exporting, therefore creating horizontal FDI. If transportation costs are high and the differences in production costs are important, corporations can engage in vertical FDI, and then re-exported to external markets.

The theoretical models discussed consider both vertical and horizontal FDI, modeling their implications for the competitive structure of sectors host. Given that multinationals generally operate in oligopolistic industries, Markusen and Venables (1999) show that their market penetration increases competition, which is detrimental to local competitors. This effect appears particularly significant in developing countries. From another perspective, Alfaro and Rodriguez-Clare (2004) emphasize the demand for inputs created by multinational corporations at the local level. In their opinion, the intermediate goods sector is characterized by monopolistic competition and the downstream entry of multinationals should encourage diversification of inputs, potentially beneficial for local clients as well. Keller and Yeaple (2009) construct a complex mechanism by which technology transfer takes place at the intra and inter-industry level. They also separate pecuniary externalities from purely technological ones and the effects on the labor market. The contradictory effects highlighted by the theoretical models lead us to believe that the question of the impact of FDI can only be answered by an empirical approach.

The volume of empirical studies that address the issue of FDI spillovers and their impact on domestic firms is much higher than the theoretical studies. We first emphasize that there is a contradiction between macro and micro level studies. The first use aggregate data for a single country or a group of countries, and systematically obtain a positive impact of FDI on economic development in host countries (Bloningen and Wang, 2004, Campos and Kinoshita, 2002, Neuhaus 2005, Li and Liu, 2005; Adams, 2009; Azman-Saini et al. 2010). Macroeconomic studies, although popular, provide a limited scope for interpretation. Since the coefficient for FDI is the result of possible opposing effects, we don't know the relative importance of each one. Microeconomic studies, on the other hand, are able to reveal more into detail the complexity of the technology transfer mechanism. The idea is to consider the effects on the productivity of local firms, while taking into account linkages with FDI. In contrast to macro studies, which often argue in favor of a positive effect, the findings of micro studies are very diverse: some find a positive effect (Damijan et al, 2003, Kolassa, 2008), others find a negative effect (Aitken and Harrison, 1999, Javorcik, 2004), while a third category reveals no significant effect (Girma et al. in 2002, Bari and Strobl, 2002, Kinoshita, 2002).

As a general remark, most empirical studies highlight two main ideas. The first one is that vertical technology transfer is more intense than horizontal one (Javorcik, 2004; Spatareanu

and Javorcik, 2008; Hanousek et al 2011). The second idea stresses the importance of specific characteristics of firms, sectors or host country in capturing spillovers. Among the factors cited at the micro level to influence the magnitude of spillovers we mention: the size of firms, human capital, innovation efforts, the ownership structure, technological intensity or export orientation (Castelanni and Zanfei, 2003, and Spatareanu Javorcik, 2008, Nicolini and Resmini, 2010). Macroeconomic studies emphasize the importance of the level of economic development (Borensztein, De Gregorio and Lee, 1998), trade openness (Balasubramanyam et al. 1996), financial development (Alfaro et al. In 2004, Azman-Saini et al., 2010), human capital (Blomstrom et al, 1994) or R&D investment (Campos and Kinoshita, 2002).

RESEARCH OBJECTIVES

This dissertation contributes to the literature studying the effects of FDI on the economy of host countries. The main objective of our research is to quantify the effects of FDI technology transfer on economic growth. We therefore place ourselves in the framework of the new international trade theory, which focuses on the role of increasing returns and network economies.

The foundations of economic growth are found in productivity improvements at microeconomic level. Technology transfer by FDI results in plant level productivity changes. Considering therefore that the effects of FDI have microeconomic foundations, in trade linkages and the competitive market structures, the first part of this dissertation determines the effect of technology transfer on the productivity of local firms. The questions we ask are: What are the channels of technology transfer and what is the relative importance of each channel? What is local firms' status mostly adapted to capturing technological spillovers? Is it supplier, client or competitor? Are there factors within the firm or the industry that can favor spillovers? We will also highlight the presence of two alternative channels of technology transfer, virtually ignored in the empirical literature: labor turnover and supply-backward spillovers.

Although the microeconomic mechanism is the most relevant, economic policy measures are taken considering aggregated effects. It is therefore important to know how the various microeconomic mechanisms combine at macro-level. Therefore, the second part of the thesis analyzes the phenomenon of technology transfer from a macroeconomic perspective. We

want to see the extent to which technological externalities found at plant level can be found at aggregate level. The structure of the second part is justified by the dual nature of foreign direct investment (capital flow and technology flow). We therefore run a separate analysis of each component, and then study their combined effect.

If one considers FDI as an international capital flows it is expected to find the effects on the host economy in the capital accumulation process (De Mello, 1997). In this perspective, we ask several questions: what part of FDI flows are converted into real investment? How do domestic firms react at FDI entry on the market? Are FDI and local investment are complements or substitutes?

If we extend the nature of FDI to a complex structure, consisting of both capital flow and technology, the effects on the local economy are expected to result in an accelerated growth rate (Baro, 1991, Wang and Blomstrom, 1992, Keller and Yeaple, 2009). We first test the hypothesis that FDI is a determinant of technical progress, which would be equivalent to a validation of aggregated spillovers. Second, we determine the overall net effect of the two components of FDI by estimating a growth model in line with Barro (1991). The last part of the thesis is devoted to the study of double causality between FDI and economic growth.

Although FDI affects different areas of the economy (labor market, exchange rate, balance of payments), we limit our analysis to the consequences of technology transfer. We recall that this transfer takes place in the absence of official transfer procedures, such as licensing. The term technology is used throughout the thesis in its broadest sense, including product technology, process and distribution technology, management and marketing skills. We also use the term spillover in a broad sense, since we cannot empirically distinguish pure knowledge transfer from economies of scale or competition effects. Furthermore, we restrict the analysis to FDI inflows, without addressing outflows. In the CEEC case, outflows are very low and their treatment is not the subject of our study.

In this thesis, we will limit the scope of analysis to the countries of Central and Eastern Europe (CEEC), new EU members in 2004 and 2007. The list of countries includes the Czech Republic, Hungary, Poland, Estonia, Latvia, Lithuania, Slovakia, Slovenia, Romania and Bulgaria. These countries have common characteristics, related both to the former socialist structures and the economic transition process. CEEC had an industrialized economy and a highly skilled workforce, which differentiates them from most emerging countries. They

accomplished the privatization process when FDI reached historical values, the two phenomena being strongly correlated in the region during the 90s.

After the fall of communism and the market liberalization, these countries have undergone significant changes, following a convergence process towards Western Europe. FDI has played an important role in the transition period, both in capital accumulation and the technological upgrading. With the contribution of FDI, the countries of Central and Eastern Europe increased their productivity and exports, improved their infrastructure, developed their financial systems and accelerated structural reforms (Hanousek et al. 2011). There are even opinions considering that the technology transfer accompanying FDI was more important for transition economies than the flow of capital itself (McMillan, 1996).

With the combination of industrialized structure, a major technological gap, a high stock of human capital and the proximity to Western markets, Central and Eastern European countries represent a special case in the global flow of FDI. Precisely because of these characteristics, the effects being observed in these countries may be different from those usually highlighted in developing countries. We therefore believe that they deserve a special attention. Throughout the thesis, particularly in Chapters 2 and 3, we closely analyze the Romanian economy. As a European country of large size, characterized by a specific evolution during transition and benefiting from strong FDI inflows in recent years, Romania presents a particular stake in studying FDI impact. As we will progress with our analysis, we compare the situation in Romania with other countries in the region, trying to highlight specific factors.

METHODOLOGY

Setting up objectives allowed us to build a research strategy and to adopt a specific methodology for each chapter. The first step in our research was obviously the literature review. We were faced with a huge volume of literature, with more or less theoretical foundation. Structuring the references into a coherent framework has been a real challenge. We finally divided the literature into two segments, the first related to industrial organization and the second to growth models. Moreover, the dissertation itself is structured in two parts, according to these two strands of literature.

This review allowed us to identify two different approaches, with contradictory findings: the macroeconomic and microeconomic analysis. In order to reconcile the gap between the two

and to have a full appreciation of the phenomenon, we begin in the first part by a microeconomic analysis (Chapters 1, 2 and 3), which will then be extended at the aggregate level in the second part (chapters 4, 5 and 6). The approach is justified by several arguments. First, technology transfer is essentially a microeconomic phenomenon, including the identification of the channels cannot be achieved at this level. Despite its richness in terms of specific findings to various groups of economic agents, the microeconomic approach does not allow to estimate a net effect. This aspect stems from a macro approach. The analysis of the determinants of economic growth is nevertheless particularly difficult in the case of the CEEC due to structural changes they have undergone, the short time horizon and the breaks in time series data.

Concerning the data used for econometric modeling, we constructed two databases, a plant level database and macroeconomic database. The first one contains financial information on about 2,000 Romanian companies for the period 1999-2007, extracted from the AMADEUS database Bureau van Dijk. Firms are classified into 33 industries and are uniformly distributed among the eight regions of Romania. This database was supplemented with technical coefficients for inter-industry trade, based on various input-output tables. The second database contains annual data on the ten countries of Central and Eastern Europe, for the period 1990-2010. The data is related to investment, growth, capital flows, trade liberalization etc. The database was constructed from many sources, such as the World Bank, IMF, UNCTAD, WIIW, Barro and Lee Human Capital database.

In the choice of econometric methods, we paid special attention so that they would respond to two shortcomings we have identified in previous studies: micro level self-selection and macro-level endogeneity. These phenomena may lead to an overestimation of the effects of foreign capital. In what follows, we present the methodologies used in two parts of the thesis.

Technological externalities are highlighted at plant level by the effects on total factor productivity (TFP). The fact that input allocation is not independent of productivity raises problems in the conventional approach of estimating TFP. We therefore use a semi-parametric method such as Levinsohn Petrin (2003), which allows us to account for endogeneity between labor allocation and productivity shocks. To quantify the potential for technology transfer, we measure the productivity premium of FDI relative to domestic firms. Given the risk of self-selection of foreign investors, we use for this purpose the Propensity score matching technique. This method is based on matching firms based on their probability of belonging to

one group or another. Thus, the creation of pairs of statistical twin firms (one foreign and one local) ensures similar characteristics and allows us to interpret the result in terms of causal effect of foreign ownership on productivity.

During the analysis of indirect transfer through vertical spillovers, we built various indicators on the basis of the foreign presence in each industry and the inter-industry trade flows highlighted in the input-output tables. Manipulating these tables was extremely difficult, requiring conversions from several activity classifications and calculation of technical coefficients specific to each industry. The data allowed us to calculate three measures of trade intensity, one intra-industry and two inter-industry. The introduction of these indicators in regressions that explain the productivity of local firms allows us to highlight technological spillovers. These estimates have been performed through a random effects panel model.

The empirical analysis of the second part focuses on the macro-economic dimension. We seek to find what is the effect of FDI on domestic investment, technological progress, and then globally on growth. The dynamic nature of the equations and the reverse causality between FDI and the dependent variables require the use instrumental variables. Finding external instruments in this context is problematic, given the fact that factors attracting foreign investors are also determinants of growth. We therefore focus on internal instruments and use the generalized method of moments (GMM - Arellano and Bond, 1991, Blundell and Bond, 1998). This type of estimator has become very popular in empirical research, since it corrects the dynamic panel bias and provides efficient estimates, even in the presence of endogenous explanatory variables.

Simultaneously instrumenting FDI and local investment allows us to compare the contribution of two types of investment to economic growth. Isolating the exogenous component of FDI decouples the double causality between FDI and growth. However, this approach has the disadvantage of ignoring the endogenous component. In order to take into account the influence of growth in attracting foreign investors it requires a system of simultaneous equations. The objective of this approach is to add a second equation to include growth among the determinants of FDI. Given the interaction between FDI, domestic investment and growth we also specify a third equation for local investment. The estimate of the system is made using the method of the Three Stage Least Squares in (3SLS).

STRUCTURE OF THE THESIS

This thesis is organized into two parts, each comprising a theoretical chapter and two empirical chapters, following the objectives outlined above. The first part contains a microeconomic analysis of mechanisms of technology transfer and highlights the spillover effects generated in the Romanian economy. The second part is devoted to a macroeconomic perspective, studying the effects of technology transfer on capital accumulation, technological progress and growth. In the following we will give a brief summary of each chapter

CHAPTER 1. THE ROLE OF FOREIGN DIRECT INVESTMENT IN INTERNATIONAL TECHNOLOGY TRANSFER

This first chapter aims to highlight the mechanism of technology transfer associated with FDI. The first section includes a brief theoretical overview on technology, technical progress, productivity and growth. The comprehensive literature review allowed us to identify the channels most likely to promote technology transfer in Central and Eastern Europe, associating each of them to the different economic implications.

We analyzed in the main part of the chapter specific channels used by foreign investors for technology transfer. We discussed here the direct transfer (from multinationals to the subsidiary) and the indirect (from subsidiaries to local firms). It is assumed that multinationals own a more advanced technology, which is the source of direct technology transfer. The indirect transfer takes in the form of horizontal technological spillovers (within the same industry) and vertical (in upstream and downstream industries). Horizontal spillovers are still controversial in the literature because of the mixed results. Some studies show positive effects for local firms, due to labor mobility and demonstration effects. Other studies show an adverse competition effect.

The studies generally converge to the idea that vertical transfer is more intense than horizontal transfer. In order to upgrade their local suppliers and ensure high quality inputs, subsidiaries are deliberately transfer technology to local firms in upstream markets. Downstream transfer is not yet sufficiently studied. Clients sourcing by foreign affiliates could benefit from improved inputs, but the evidence so far indicates that they are often negatively affected by the complexity of these inputs and their prices higher.

The description of technology transfer channels reveals several effects, often acting in opposite directions, making it difficult to formulate expectations about the overall impact. Kinoshita (2002, p.5) concludes that "it is difficult to distinguish specific channels [of technology transfer] because the mechanism of FDI spillovers is complex and often interdependent." Determining the actual channels through which technology transfer takes place is an essential step to orientate macroeconomic policies in order to exploit these spillovers.

We have also highlighted the main factors encouraging foreign affiliates to allow access to their stock of knowledge and those that stimulate local firms to meet them. The literature review applied to transition countries has helped us to formulate research hypotheses, which will be empirically tested in the following chapters.

CHAPTER 2. THE POTENTIAL FOR TECHNOLOGICAL SPILLOVERS IN THE ROMANIAN ECONOMY

The second chapter contains a quantitative estimation of the potential for FDI technology transfer in Romania. In order to reach that objective, two conditions need to be validated: the technological superiority of foreign firms and the intensity of trade linkages between foreign and domestic firms.

The idea of technology transfer is based on the implicit assumption of technological superiority of foreign firms, which is though rarely tested empirically. We consider here the risk of foreign investors self-selecting themselves in highly productive industries or more efficient firms, leading to an overestimation of spillovers. Because technology transfer is justified only in the presence of a minimum performance differential, we measure this differential by the excess productivity registered by foreign subsidiaries.

By comparing the foreign companies with local ones, we found that foreign affiliates have a 20% higher productivity than similar local firms. We interpret this result in view of the internationalization theory, concluding that foreign companies in Romania have some specific advantages, difficult to imitate by local competitors, allowing them to be more productive. This is a prerequisite for the manifestation of technological spillovers, as evidence of the knowledge stock held by subsidiaries. An important result is the indication that foreign investors tend to be attracted by industries with a large foreign presence and above average

productivity and they cherry-pick domestic firms according to size, productivity, capital/labor ratio and profitability.

Due to this self-selection phenomenon, about 40% of productivity observed differences are only apparent, being actually determined by other factors not foreign ownership. We also note that the productivity differential decreases over time, indicating the existence of technology spillovers for local firms. Third, foreign subsidiaries offer higher wages for similar workers. Given that foreign affiliates can attract employees by offering efficiency wages, we can expect labor mobility between the two groups of firms, potential source of horizontal spillovers.

A second prerequisite for the realization of technology transfer is the existence of a minimum level of involvement of foreign affiliates in the local economy. Although the stock of technology owned by foreign companies was important, the lack of interaction with local firms would make it impossible to value. Thus, the only type of transfer that would take place would be the direct one. We therefore constructed three indicators measuring the intensity of trade between foreign affiliates and domestic firms (one horizontal and two vertical) and we identified the most promising sectors to capture technology.

The validation of these two conditions offers us favorable indications as to the existence of technological spillovers, which we will empirically test in the next chapter.

CHAPTER 3. THE CONTRIBUTION OF FOREIGN DIRECT INVESTMENT TO TECHNOLOGY TRANSFER IN ROMANIA

The purpose of this chapter is to run an empirical study to measure the direction and magnitude of technological spillovers at the plant level. In this regard, we identify the main channels through which technology transfer takes place in Romania, their intensity and the effects on the productivity of local firms. To determine total factor productivity (TFP) we use the semi-parametric method of Levinsohn and Petrin (2003), which allows us to correct problems of endogeneity between input allocation and productivity shocks. We restrict the analysis to the sample of domestic firms in order to avoid self-selection and introduce the variables of intra and inter-industry foreign presence in the explanation of the TFP.

Our results confirm previous studies on Romania. While vertical externalities are always present, horizontal ones are often not significant. The only channel of horizontal technology transfer that appears to be important is labor mobility. Following the recruitment of staff who worked in foreign subsidiaries, the Romanian companies benefit from the skills they have acquired inside the multinational, recording an increase in productivity.

The status of FDI supplier promotes a higher productivity, foreign affiliates being directly interested in the quality of the technology used by their suppliers. We also note that upstream spillovers are more important for local suppliers than for other foreign suppliers of FDI, because of the higher technological gap. For clients of foreign subsidiaries, however, the situation seems less favorable. The complexity of intermediate goods and the higher supply prices often generate efficiency losses in downstream industries. The magnitude of negative downstream spillovers is greater than that of positive upstream spillovers. Therefore, local customers buying from the same suppliers do not benefit from a possible second order indirect spillover. This raises concerns about the social return on technology transfer and the need to subsidize it.

In addition to the main objective, we sought to identify catalytic factors that influence the direction and magnitude of technology spillovers. Thus, we divided the sample according to value added, export orientation and technological intensity, which has resulted in interesting economic implications. We also tested the hypothesis that technology transfer may be conditioned by the absorption capacity of local firms. We have approximated absorption capacity by human capital and intangible assets and we have found that local firms benefit from positive horizontal spillovers only at average levels of human capital. Companies with highly skilled employees will compete with foreign subsidiaries, that offer higher wages, labor turnover taking place from domestic firms to foreign subsidiaries. This negative effect can be offset if local companies invest in research and development, thereby facilitating the capture of a horizontal technology spillover.

The last line of analysis is devoted to the technological gap of local firms and its impact on the ability to capture positive spillovers. Our results indicate that the larger the technological gap, the more likely it is the firm to benefit from the proximity of foreign subsidiaries.

CHAPTER 4. INTEGRATING FOREIGN DIRECT INVESTMENT IN THEORETICAL GROWTH MODELS

Chapter 4 contains a discussion on the theory of economic growth, in order to identify the means by which foreign investment can affect growth. We focused on two aspects that define FDI flows: capital accumulation and technological spillovers. We have developed two simple models of exogenous and endogenous growth, in order to illustrate the mechanisms through which FDI affects economic growth.

Taking the structure of the Solow (1957) growth model and dividing the capital stock into a local part and a foreign part, we can draw conclusions about the role of FDI in economic growth. Thus, if one looks at FDI strictly in terms of capital flow, its effect is limited to influencing the income steady state level. In other words, FDI sets a higher equilibrium level, but do not affect the convergence rate towards this equilibrium. Beyond a certain level of capital accumulation, capital no longer contributes to increase production, because of its diminishing returns. Hence, there is no long-term effect. We moderate this perspective for the case of CEEC, which are still far from their equilibrium state and the convergence process might still take a long time. In our opinion, the CEECs are still on the upward slope of the capital/labor ratio. We conclude that the contribution of FDI to economic growth through capital accumulation is limited to the short term. However, the magnitude and duration of the transient effect of FDI depend on the dynamics of each country towards steady state.

As the first part of the dissertation focused on the analysis of technological spillovers, the progression to an endogenous growth model à la Romer (1990) was natural. The analytical framework developed allowed us to aggregate the microeconomic foundations in a simple model where technical progress is a function of FDI. Thus, unlike the previous approach, we consider FDI as complex flow, containing both capital and technology. This turns out to have a significant impact on long-term growth. In addition to increasing the level of steady state income, FDI also influences the speed of convergence to this equilibrium. This is possible because of compensating the diminishing returns to capital by the increasing returns of technology. The result is very important because it calls for long-term effect of FDI on economic growth. This is also the theoretical basis for testing technological spillovers at the aggregate level.

The final part of the chapter is devoted to a deterministic growth accounting exercise in CEEC, in order to measure the contributions of capital, labor and technical progress to economic growth. The results show that capital accumulation and technical progress are the main components of economic growth in CEE. FDI could theoretically affect both components. However, by studying the correlations at aggregate level, the contribution of FDI to economic growth through capital accumulation does not seem to be validated. In contrast, higher FDI inflows are associated with an acceleration of technological progress. Given the structure of endogenous growth models, the explanation of technical progress through technological changes introduced by FDI can be a source of long-term growth. We recognize the limitations of a deterministic decomposition of growth. Still, it allows us to formulate hypotheses about the relationship between FDI and growth, whose validation will be tested in Chapters 5 and 6.

CHAPTER 5. EMPIRICAL ANALYSIS OF THE FDI – DOMESTIC INVESTMENT RELATIONSHIP IN CENTRAL AND EASTERN EUROPE

Chapter 5 contains an empirical analysis of the effect of FDI on investment dynamics in Central and Eastern Europe. This issue derives from the role of FDI in exogenous growth models, as a source for capital accumulation. Unlike the current language, FDI does not represent the investment made by foreign companies. FDI is in fact a financial flow, which does not guarantee its transformation in fixed capital formation. We first determine the extent to which FDI flows are transformed into real productive investment. Then, knowing that the FDI flows are not just an addition to the existing capital stock, we assume that they can change the capital stock structure. Specifically, we consider that local investment is not independent of FDI flows and we are interested in the reaction of local investors to FDI entry.

Domestic investment and FDI may be complementary when the increased demand for intermediate goods stimulates the production of local suppliers and encourages them to make new investments. On the contrary, if FDI follows the existing structure of the economy and goes to industries where there are already many local firms, increased competition may lead to a crowding out effect.

The empirical analysis using the generalized method of moments GMM Arellano Bond (1991) suggests that there is a substitution between FDI and local investment in CEE.

Although the effect diminishes over time, the long-term evolution does not show a transformation into a complementary relationship. Given the different nature of the FDI components, we separate FDI in greenfield investment and mergers and acquisitions (M&A) and separately analyze the interaction with local investment.

Greenfield investments appear to be the only ones contributing significantly to fixed capital formation. Despite an initial competition effect, technological spillovers and the creation of trade linkages with local producers offset the short term substitution effect. Thus, the relationship between greenfield and local investment takes the form of a creative destruction process. Mergers and acquisitions, on the other hand, are the expression of financial transactions due to ownership changes of existing assets. Thus, it is not surprising that M&A have no significant impact on fixed capital accumulation. However, M&A bring financial resources, which are then collected and redistributed by the financial market for local investment projects. Countries with more developed financial markets benefit more from this stimulating effect, due to their ability to effectively redistribute resources where they are needed.

Third, we distinguish competition on the financial market from commercial competition. The first type of interaction generates a stimulating effect on domestic investment, being specific to mergers and acquisitions. The second type of interaction gives a substitution effect and is specific to greenfield investments. Overall, the positive financial effect is offset by the negative trade substitution. Although these two mechanisms are present in theoretical studies, we are not aware of any studies to analyze them empirically.

The results of this chapter converge towards a creative destruction effect. If a positive impact of FDI on growth is to be expected, it can only come from the stimulation of technical progress. This analysis is performed in the last chapter

CHAPTER 6. FDI, TECHNOLOGY TRANSFER AND ECONOMIC GROWTH IN CENTRAL AND EASTERN EUROPE

The objective of the final chapter is to empirically analyze the relationship between FDI and economic growth. Given results in chapter 5, we assume that FDI can affect economic growth through technical progress rather than capital accumulation. This assumption arises from endogenous growth models that consider FDI as a determinant of technical progress. The

questions we ask are: what is the net effect of opposite direction spillovers identified at the micro level? Is the overall effect of FDI on growth positive or negative? Is there a difference between the contributions of FDI and domestic investment to growth? Is the effect of FDI conditioned or amplified by the presence of certain factors? What are these factors in CEEC?

Since the microeconomic effects combine at aggregate level based on the relative importance of each one, but also on host country characteristics, we consider a macroeconomic approach suited to capture the net result of these opposing effects. The empirical analysis presented in this chapter has three parts.

The first part of Chapter 6 is devoted to analyzing the role of FDI in stimulating technological progress. To this end, we measure technical progress by changes in total factor productivity. Assuming that FDI improves the productivity of local firms and the acceleration of technological progress, we introduce FDI in the list of TFP determinants. This approach, which departs from the traditional literature, allowed us to highlight the global spillovers. Our results confirm that FDI is one of the main determinants of technical progress in the CEEC, together with institutional development and infrastructure. FDI has a direct effect, but its magnitude is influenced by the presence of some local features, such as R&D expenditures and the technological gap. These influences are the same as those observed at the micro level in Chapter 3.

The second part of the chapter follows the conventional growth regressions, using a Barro (1991) endogenous model to understand the role of FDI as a determinant of economic growth rate. By combining the negative effect on capital accumulation with the positive spillovers, we are able to confirm an overall positive impact of FDI on economic growth. This shows that the FDI – growth relationship is dominated by the spillover component. Unlike most studies that reveal thresholds of the local absorptive capacity, we find that the effect of FDI in CEEC is independent. Trade openness, human capital and financial development do not influence this effect.

Throughout the chapter, we tried to isolate the exogenous component of FDI flows, in order to study its unilateral influence on economic growth. This approach, however, limits our understanding of the FDI - growth relationship. The last part of Chapter 6 is intended to complement this perspective by adding the influence of growth on FDI. Thus, we recognize the endogenous nature of this relationship. By using simultaneous equations, we find that FDI causes economic growth and growth in turn attracts more FDI. The dependency relationship is

thus transformed in an interdependent relationship, which indicates a virtuous circle between FDI and economic growth.

The separation of the analysis period into two sub-periods provides an opportunity to make interesting observations. The transition period is dominated by the effect of FDI on capital accumulation. In addition, the causality goes from growth to FDI and not vice versa. Technological spillovers become increasingly important in the post-transition period. The relationship between FDI and economic growth thus evolves towards a reciprocal causality. This pattern reflects the maturation of Eastern European economies. FDI now have a contribution to growth that is greater than that of local investment, indication of a process of endogenous growth.

We also noted the reorientation of foreign investors. During the transition period, they had pursued an efficiency seeking strategy, searching for low production costs. The post-transition period is marked by a change in strategy towards market seeking, where the prospect of new markets largely exceeds the advantage of low labor costs.

EXTENSIONS AND FUTURE RESEARCH PERSPECTIVES

Prospects for future research focus on three main directions. The extensions include both the development of research questions already present in the dissertation and the application of new econometric methodologies.

We first consider the microeconomic analysis to require more attention, because this is essence of where economic behavior dealing with technology transfer and the foundations of economic policies. Since in this thesis we have focused on the characteristics of local firms that could influence the direction and intensity of spillovers, we would like to complete the analysis with factors specific to FDI. If in this thesis we have positioned ourselves in terms of local businesses, it would be interesting as well to analyze the phenomenon from the perspective of foreign subsidiaries. Thus, we propose to study two FDI characteristics: ownership structure and the origin of investors. Specifically, we believe that majority or minority owned subsidiaries have different implications for technological spillovers. Finally, it seems particularly useful to know the origin of foreign investors. Geographical distance and

possible trade barriers may influence the type of FDI and their integration into the local market. We therefore consider this line of research very promising.

A second direction for future research is the compared volatility of investment between foreign subsidiaries and local firms. It is possible for foreign subsidiaries to record lower investment volatility during crisis periods. If this is the case, is it explained by easier access to financing through the parent companies? The problem is very interesting because there are also opinions stating that multinationals smooth their activity fluctuations by transferring volatility to their subsidiaries. Because the crisis has reached the CEEC with a delay, we expect the future data availability to allow testing these hypotheses.

A third line of research concerns the nonlinear relationship between FDI and local absorptive capacity. We have already tested this issue using interaction variables. Although we did not find evidence of absorptive capacity threshold, further study of this point should be made. A limitation of the approach to non-linearity by interaction variables is the assumption that the FDI effect varies monotonically across the range of the absorption capacity. It is still possible for a threshold of the absorptive capacity to exist, but the relationship not to be monotonic. The analysis of this hypothesis requires the application of an appropriate methodology, which takes into account threshold effects. Anticipating that the transition between the two regimes imposed by the threshold is not sharp, we prefer the Panel Smooth Transition Regression of Gonzales et al. (2005). This methodology allows a more flexible approach to the interaction between FDI and local conditions.

This thesis has demonstrated the role of FDI in economic development in host countries. The micro-economic mechanism of spillovers has shown that the position of local firms in the supply chain is essential in order to capture positive spillovers. The aggregate effect of FDI on technological progress is positive. Nevertheless, the relationship developed with local investors indicates a short-term crowding out effect. FDI is clearly a determinant of growth in CEE and the relationship is mutually reinforced.