universität wien

MASTERARBEIT

Titel der Masterarbeit

„The inflow of foreign direct investment to central European countries between 2004 and 2013. Panel data analysis.“

Verfasst von

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angestrebter akademischer Grad

Master of Science (MSc)

Wien, 2015

Studienkennzahl lt. Studienblatt:	A 066 913
Studienrichtung lt. Studienblatt:	Masterstudium Volkswirtschaftslehre
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INTRODUCTION

In the modern world, as a consequence of continuously progressing technological advancement, especially in the area of communication and information infrastructure, and due to continuous globalization, we observe liberalization of international trade. Undoubtedly, one of the symptoms of the ongoing process has been continuous tightening of investment and production relations between various countries in the world that gradually led to the creation and development of uniform global market. This in turn, made the economic expansion of transnational corporations possible and consequently led to a significant intensification in international capital flows and knowledge diffusion in the form of foreign direct investment (FDI). What is more, over the time, systematically increases the importance of foreign direct investment as a stimulus of economic development, particularly in countries and regions characterized by considerable economic potential and rich in natural and social resources. This type of investment consists of the location of capital, durable goods and knowledge abroad by entrepreneurs, in particular by transnational corporations, in order to achieve a real influence on the functioning of firms in which the resources are located. In relation to this, FDI undoubtedly becomes more and more important tool in the process of international capital exchange and one of the major determinants of development. For this reason the analysis and monitoring of foreign direct investment is a crucial matter for the effectiveness of both macroeconomic and microeconomic policy of governments in all the countries around the world.

The research problem in this master thesis will be to investigate the factors influencing the volume of the inflow of foreign direct investment to a group of central European countries that during the last 25 years have underwent a transformation from centrally planned economy to market economy, namely, to Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia in the ten-year time period between 2004 and 2013.

In the theoretical part of the study the idea of foreign direct investment is to be explained, including the definition of the term and the basic characteristics of the investigated phenomenon. Furthermore, the global trends in FDI and the inflows of foreign capital to selected transition countries are to be described. Another relevant point to be discussed are the main concepts of foreign direct investment. Those, among others include location determinants theory, eclectic paradigm widely known as the OLI framework and Dunning's new paradigm of development.

The experimental part of the research shows the results of fixed effects and time-fixed effects panel data models estimation investigating the influence of market size, market growth, exchange rate, openness to trade, corporate tax rate, labour cost, country risk and the level of development of infrastructure on foreign direct investment inflows to the selected central European countries in the time period 2004-2013.

The remainder of the paper is organized as follows. Chapter I outlines the definitions of foreign direct investment (FDI) and describes the trends observed around the world in the time period 2004-2013. The literature review is presented in Chapter II. Chapter III is devoted to the dataset description. Model specification and the estimation results are presented in Chapter IV. Finally, the Conclusions section summarizes the outcomes of this work.

CHAPTER I

Foreign Direct Investment - definitions and trends

Foreign direct investment (FDI) is widely perceived as a way towards the achievement of greater integration of the world economy. The main reason behind this common view is the fact that international presence allows multinational enterprises to lower the transaction costs associated with international business, but not only. Even more importantly, especially from the perspective of the worldwide economic integration, FDI helps to channel goods, services, capital, labour and technology between various destinations around the world. Furthermore, as indicated in a paper by Thomsen (2000), foreign direct investment can also play a significant role as a factor stimulating competition in the local economy, provided that appropriate trade and active competition policies have been introduced. Consequently, the ultimate result for the countries involved in FDI is improved growth prospects and greater integration of those entities with the global economy. As it has been suggested above, foreign direct investment appears to be a beneficial process of crucial importance for every state aiming at steady economic growth and sustainable development. This, however does not provide any explanation on what should we exactly understand by the term "FDI". Thus, the first thing to be done would be to give a precise explication of the issue under scrutiny in this study.

In the literature, according to the criterion of the level of control over invested capital, international investment is divided into two main groups: portfolio investment and foreign direct investment. Following the definition proposed in the "OECD Benchmark definition of Foreign Direct Investment", the first one from among the above mentioned categories is characterized as "crossborder transactions and positions involving debt or equity securities, other than those included in direct investment or reserve assets[1]". Moreover, it has been stated that as compared to direct investors, portfolio investors typically have a significantly smaller influence on the decision making process in the enterprise. Portfolio investment differs from other investment forms also in terms of the way to access financial markets it provides. As it is associated with specialized service suppliers, including exchanges, dealers, and regulators it can give the investors liquidity and flexibility. To be more precise, what makes portfolio investment different is the nature of financial derivatives as instruments through which risk is traded in its own right in the financial markets[2]. The above presented interpretation does not however appear to be of any explanatory value until the term direct investment will be explicated.

In line with the benchmark definition proposed by the Organisation for Economic Cooperation and Development (OECD), foreign direct investment is a type of investment in which the main objective is establishing a long-term relationship and a significant degree of influence on the management between the direct investor who is a resident enterprise in one economy and a direct investment enterprise that is a resident in other economy than that of the direct investor. In this place, it seems necessary to clarify what exactly is meant by the residence of an economic entity or of an institutional unit. According to the explanation provided by the OECD, a residence of an organization is the economic

[1] Balance of Payments and International Investment Position Manual, Sixth Edition (BPM6), International Monetary Fund, Washington, D.C., 2009, pp. 110.
[2] Balance of Payments and International Investment Position Manual, Sixth Edition (BPM6), International Monetary Fund, Washington, D.C., 2009, pp. 99.

territory with which it has the strongest connection or in other words, its predominant centre of economic interest[3]. As a result, all the transactions concerning the units possessing their main location in the same country are excluded from the above described category. An evidence for the existence of a lasting interest in an enterprise is the direct or indirect ownership of 10% of the voting power by an investor resident in another country. Opponents of the above presented definition suggest that in some situations possession of as little as the 10% of the voting power may be insufficient in order to exert any substantial influence on a firm. At the same time, they argue that under certain circumstances, an investor may own less than the indicated 10%, but still have an effective voice in the management of the company. Nevertheless, it is recommended in the methodology to strictly comply with the 10% threshold to ensure statistical consistency across countries[4].

According to what has been stated in the Balance of Payments and International Investment Position Manual (BMP6), published by the International Monetary Fund (IMF), typically, the voting power possessed by a direct investor is proportionate to his ownership of ordinary shares. Notwithstanding, in some cases it may be exercised without commensurate ownership of shares. This means that the influence can also be either greater, or lower than the percentage of shares held by the direct investor. A good example here constitute the so called golden shares[5] and dual class shares. However, following the OECD specification, voting power is not only obtained through equity ownership. It may as well result from swaps and repurchase agreements. Furthermore, direct investment is not only limited to equity investments. It also relates to reinvested earnings, inter-company debt and reverse investment[6].

Having explained what the necessary and sufficient conditions are for an investment to be classified as foreign direct investment, it is now possible to specify which economic units types can become foreign direct investors. In accordance with the benchmark definition provided by the OECD, those entities include individuals, groups of related individuals (households), incorporated or unincorporated enterprises, public or private enterprises, non-profit institutions in an enterprise that operates for profit, investment funds, government bodies or international organizations, estate, trust or other societal organizations, and any combination of the above, all belonging to any sector of the economy.

As it has already been stated above, the main aim of foreign direct investment activity is to establish a long-lasting relationship between an investor and a direct investment enterprise. This type of connection is called a direct investment relationship. Enterprises interrelated in such a way are commonly known as affiliates or affiliated enterprises. In addition, following the assumptions made in the BMP6, all firms under the control or influence of the same direct investor are regarded as being in a direct investment relationship with each other. Correspondingly, two basic forms of connections between foreign investor and direct investment enterprise are identified. The first one amidst them is the immediate direct investment relationship. It emerges in a situation when a direct investor directly owns equity that gives a right to 10% or more of the voting power in the direct investment enterprise. To be more precise, if this ownership of shares exceeds 50%, then the immediate relation is described as

[3] OECD Benchmark Definition of Foreign Direct Investment, Glossary, Fourth Edition, OECD, 2008, pp.13.
[4] OECD Benchmark Definition of Foreign Direct Investment, Glossary, Fourth Edition, OECD, 2008, pp.7-8.
[5] Nominal shares which are able to outvote all other shares in a shareholders-meeting in certain circumstances.
[6] Balance of Payments and International Investment Position Manual, Sixth Edition (BPM6), International Monetary Fund, Washington, D.C., 2009, pp.100.

control and a direct investment enterprise is called a subsidiary[7]. On the contrary, when the stake owned by the direct investor comprises from 10% to 50% it is characterized as a significant degree of influence. In such a case the direct investment enterprise is characterized as an associate of the foreign company. It should be noted that both of the terms defined above refer not only to incorporated enterprises, but also to unincorporated ones. In this place, it is worth mentioning that there exists one more form of direct investment enterprise. It is known under the term "branch" and constitutes an unincorporated company located in the host country which is fully owned by its direct investor[8]. Apart from the immediate direct investment relationships, the IMF "Balance of Payments and International Investment Position Manual", distinguishes also indirect investment relationships. This particular kind of connection arises via the ownership of voting power in one direct investment enterprise that is a direct investor in another enterprise or enterprises, so as to be able to exercise indirect control or influence through a chain of direct investment relationships[9].

The next important point connected with the issue under investigation regards the transactions included in foreign direct investment. Generally speaking, these are the financial flows and income flows between direct investors, direct investment enterprises, and/or other fellow enterprises within a given time period[10]. As it has been indicated in the OECD Benchmark Definition of Foreign Direct Investment, the discussed type of investment activity involves inward and outward financial positions between directly and indirectly owned, incorporated and unincorporated enterprises. To be more precise, inward direct investment is defined as an investment by a non-resident direct investor in a direct investment enterprise resident in the host economy. In reference to the direction of the influence it is also named as "direct investment in the reporting economy"[11]. Outward direct investment is on the other hand an investment by a resident direct investor in a non-resident direct investment enterprise. This form of investment is as well described as direct investment abroad[12].

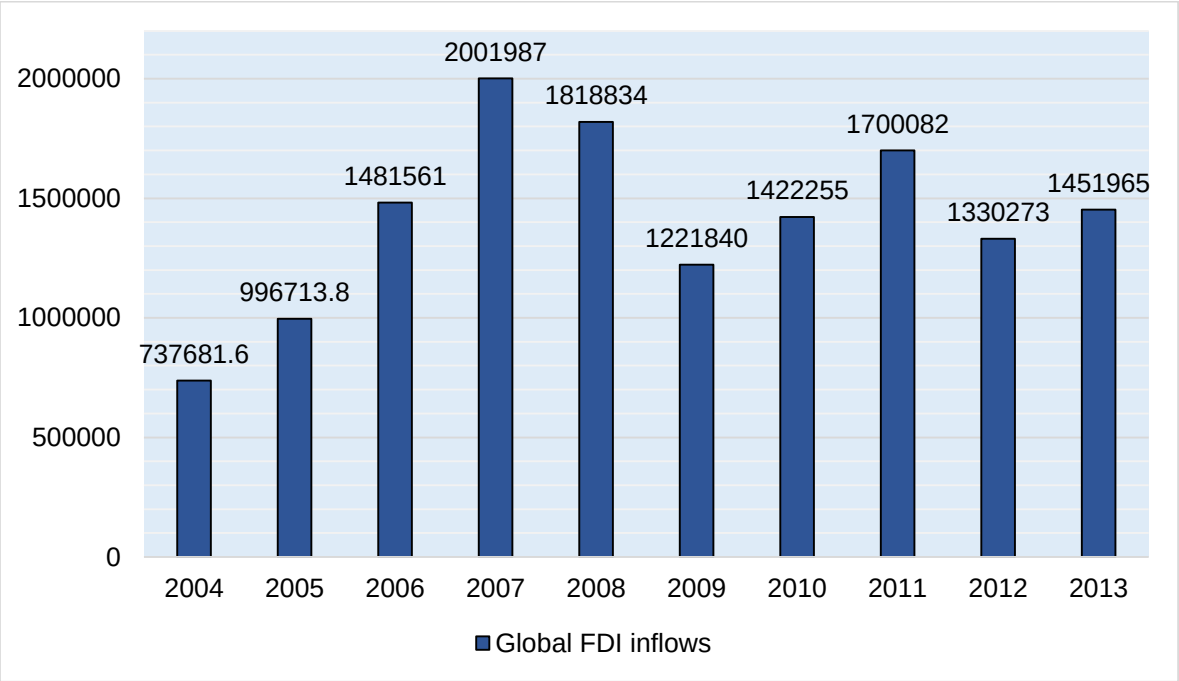
Furthermore, as indicated by de Rooij (2007), firms have multiple possibilities to reach a target market beyond national borders. The most direct of those methods include foreign acquisition, commonly known under the term "brownfield investment", and foreign start-up, which is defined as the so called "greenfield investment"[13]. The first one from the two mentioned modes of foreign direct investment takes place when an investor purchases or leases existing production facilities to launch a new production activity in the host country. The other component of FDI, referred to as greenfield investment, is primarily related to the acquisition of new assets by a direct investor. This simply means that the parent company constructs new operational facilities abroad[14]. Following the OECD benchmark definition, acquisition is a type of business transaction between unrelated economic entities based on terms established by the market where each party acts in its own interest. Moreover, the acquiring firm

[7] OECD Benchmark Definition of Foreign Direct Investment, Glossary, Fourth Edition, OECD, 2008, pp.14.
[8] OECD Benchmark Definition of Foreign Direct Investment, Glossary, Fourth Edition, OECD, 2008, pp.2-3.
[9] Balance of Payments and International Investment Position Manual, Sixth Edition (BPM6), International Monetary Fund, Washington, D.C., 2009, pp.101.
[10] OECD Benchmark Definition of Foreign Direct Investment, Glossary, Fourth Edition, OECD, 2008, pp.14-15.
[11] OECD Benchmark Definition of Foreign Direct Investment, Glossary, Fourth Edition, OECD, 2008, pp.9.
[12] OECD Benchmark Definition of Foreign Direct Investment, Glossary, Fourth Edition, OECD, 2008, pp.12.
[13] de Rooij C.; When do firms pursue brownfield over greenfield investments? A comparison of wholly owned entry modes in the international market place; Rotterdam School of Management; Erasmus University Rotterdam; 2007; pp.1.
[14] Calderón C., Loayza N., Servén L.; Greenfield Foreign Direct Investment and Mergers and Acquisitions: Feedback and Macroeconomic Effects; World Bank Policy Research Working Paper 3192, January 2004; pp.1.

purchases all the assets and all the liabilities of the target enterprise. In some situations it is the case that the acquired company becomes a subsidiary or part of a subsidiary of the acquirer[15]. Another possible option in brownfield investment is a merger. This type of transaction occurs when two (or more) companies agree to merge into a new single enterprise in order to create business synergies under the circumstances that it is much more profitable for both parties to consolidate rather than remain separate units[16].

After the key terms related to the problem under investigation in this paper have been defined and explained, it is now possible to move on to the description of recent trends in foreign direct investment around the world. For a visual representation of the patterns in global FDI observable in the time period between the years 2004 and 2013 the reader is referred to the graph depicted in Fig.1.

Fig.1. Global FDI inflows in millions of US dollars in the time period between 2004 and 2013.



Source: UNCTAD database, *Inward and outward foreign direct investment flows*, annual, 1970-2013.

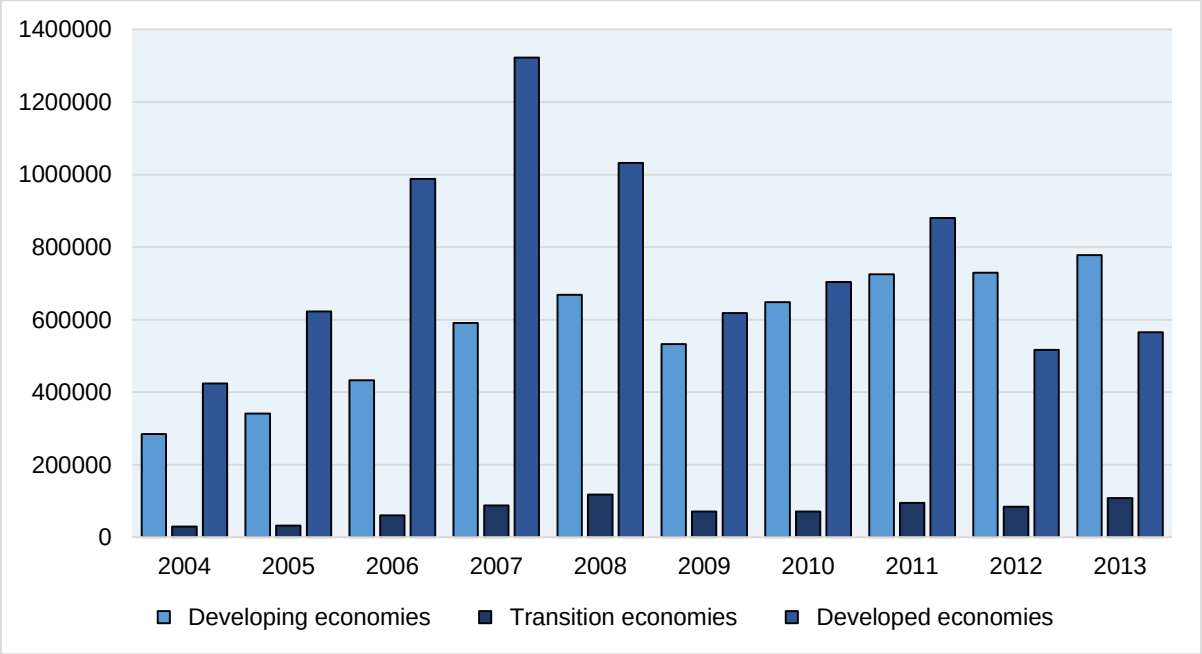
According to the information presented in the World Investment Report 2005 published by *The United Nations Conference on Trade and Development* (UNCTAD), in 2004, after three years of declines, global foreign direct investment inflows rose by 2% as compared to 2003. In particular, inward FDI to developing economies was 40% higher, and to developed countries 14% lower than previous year. One of the main reasons for increased foreign direct investment inflows in 2004 was a recovery in cross-border merger and acquisitions that resulted from low interest rates, higher profits and the recovery of asset prices. Similar upward trend was reported for greenfield foreign investment. Also FDI in services, specifically in financial services, continued to grow.

[15] OECD Benchmark Definition of Foreign Direct Investment, Glossary, Fourth Edition, OECD, 2008, pp.1.
[16] OECD Benchmark Definition of Foreign Direct Investment, Glossary, Fourth Edition, OECD, 2008, pp.11.

The year 2005 saw a further increase in foreign direct investment inflows of 29% in relation to 2004. This tendency reflects higher growth rates observed in some developed countries and strong economic performance in many developing and transition economies. In comparison to 2004, in 2005 a huge 88% rise in the value of cross-border M&As has been noted. Services was the sector that gained the most, especially finance, telecommunications and real estate.

In 2006, global foreign direct investment inflows increased by 38%. The main reason for this improvement was strong economic performance recorded in developed countries, in developing countries and in transition economies. Another cause of the boost in FDI flows were rising corporate profits and higher value of cross-border mergers and acquisitions. The leading developed host countries were the United States, the United Kingdom and France. Regarding developing economies the top foreign direct investment destinations were China, Hong Kong (China) and Singapore.

Fig.2. Annual global FDI inflows in various types of economic groupings in the time period between 2004 and 2013 in millions of US dollars.



Source: UNCTAD database, *Inward and outward foreign direct investment flows*, annual, 1970-2013.

Table 1. Annual global FDI inflows in various types of economic groupings in the time period between 2004 and 2013 in millions of US dollars.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Developing economies	284618.9	341428.3	432869.1	591161.2	668758	532580.1	648207.6	724839.9	729449.2	778372.4
Transition economies	29157.6	32414.02	60462.67	88031.05	117691.6	70664.34	70573.13	94836.26	84159.35	107966.5
Developed economies	423905.2	622871.5	988229.2	1322795	1032385	68595.7	703474.1	880406.2	516664.3	565625.8

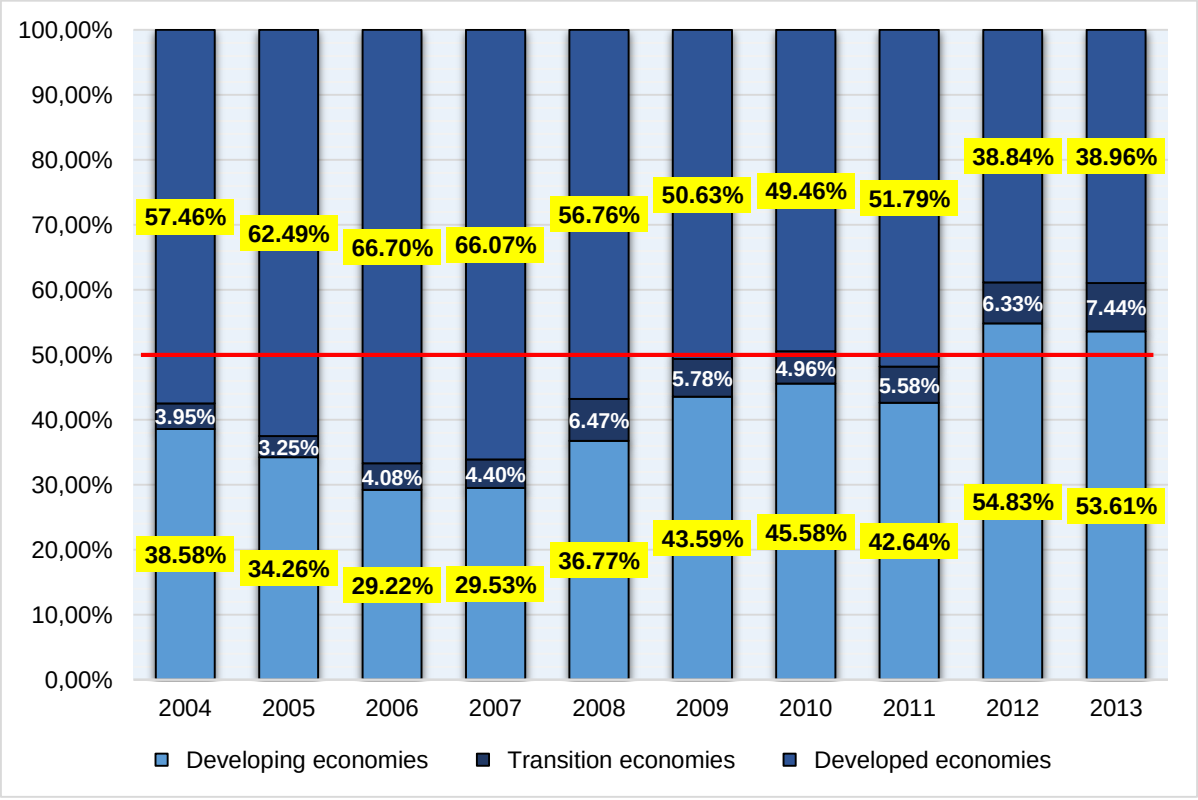
Source: UNCTAD database, *Inward and outward foreign direct investment flows*, annual, 1970-2013.

In 2007 global FDI inflows reached its highest historical level as a result of relatively high economic growth and strong performance of corporations observed in developed, developing and the transition countries. This is illustrated in Fig.2 and also in Table 1. The sub-prime mortgage crisis that began in the second half of 2007 has had a powerful impact on financial markets and created liquidity problems in many countries, resulting in higher costs of credit. Nevertheless, the investment decisions of transnational corporations (TNCs) were not significantly affected.

In 2008 total inward foreign direct investment inflows fell due to a sharp decline in inflows to developed countries. Nevertheless, FDI inflows to developing and transition economies surged. In late 2008 a decrease in inward foreign direct investment was observed in all economic groups and across all of its three components, namely: equity investments, intra-company loans and reinvested earnings. Greenfield investments, as well as cross-border M&As were negatively affected by the downturn. In numerous countries divestments have surpassed gross FDI flows.

The year 2009 brought a drastic decline in global foreign direct investment inflows (-37%) due to a depression in cross-border M&As and significantly lower profits of foreign affiliates. FDI deteriorated across all the sectors of the world economy, except from utilities, electronic equipment, construction and telecommunications. Developing and transition economies received almost half of the global FDI inflows, whereas the flows to developed economies decreased, especially in North America. Notwithstanding, the worldwide economic crisis has not led to a stoppage in the internationalization of production, in fact, it was growing. The annual composition of global foreign direct investment inflows is given in Fig.3.

Fig.3. Annual global foreign direct investment composition in the time period 2004-2013.



Source: UNCTAD database, *Inward and outward foreign direct investment flows*, annual, 1970-2013.

The year 2010 saw a modest rise in global foreign direct investment inflows despite a marginal decrease experienced by developed countries. Substantial declines were observed in Europe and in Japan, while in the US FDI rose by more than 40%. World trade and global industrial output returned to pre-crisis levels. Simultaneously, foreign direct investment inflows to all of the main branches within the services sector in 2010 experienced a downward change in value. Nevertheless, a rebound was noticed in cross-border M&As. In 2010, for the first time in the history, the volume of FDI attracted by both developing and transition economies amounted to more than half of global flows.

In 2011 total foreign direct investment inflows surged in all the major types of economic groups, but it was still far below the 2007 level. Developing countries and transition economies attracted 51% of worldwide FDI flows. Greenfield foreign direct investment was a dominant form of capital and resources location. The industries in which the highest improvements in FDI inflows occurred were extractive industries, chemical industry, utilities, transportation and communications. What is more, prolonged instability in international financial markets encouraged firms to raise their cash holdings, reduce debt levels and continue paying dividends.

The year 2012 brought a decline in global foreign direct investment inflows. The EU and the US were the most severely affected, whereas developing economies experienced only a slight decrease. Reinvested earnings became the main source of financing of long-term investment projects, especially for multinational firms originating from developing countries.

In 2013, global inward foreign direct investment was back on the path of growth. This increasing trend has been reported in all major economic groupings. Improvements were observed in the EU and in North America. Nonetheless, the UK and France experienced declines. Top world's TNCs continued to hold high cash reserves. In developing countries average cash-to-assets ratios have remained relatively constant for five years (12%). In developed countries, they increased to more than 11%.

Summing up, from this analysis it can be concluded that in the time period between 2004 and 2007, global foreign direct investment inflows have been increasing. FDI reached its historical peak in the year 2007. Afterwards, in 2008 and also in 2009 it decreased substantially. In the two subsequent years again a rebound in total inward FDI occurred, followed by a decline in 2012. Finally, in 2013, which was the last year analysed in this study, an increase occurred in global foreign direct investment inflows.

CHAPTER II
Literature review

The fundamental question that automatically arises when considering foreign direct investment activity of firms concerns the motivation of entrepreneurs behind the choice of affiliate production rather than export or licensing arrangements as a method to service a foreign market. As reported by Bruce A. Bloningen (2005), the typical answer explaining the occurrence of the above phenomenon rests on the assumption that there exist intangible assets specific to each firm, such as for example technologies and managerial skills, and this unique capital has a form of public goods within a particular organisation. Although this seems to be a reasonable explication of why it may be beneficial for companies to set up multiple plants, it does not necessarily give a rationale for them going multinational. Bloningen (2005) argues that in order to provide a comprehensive explanation of foreign direct investment decisions of managers it is crucial to note that all the assets characteristic to the firm are inevitably associated with a risk of market failure. This is mainly due to the fact that the arrangements with external parties make it difficult for the company to fully exploit the advantages arising from the possession of specific resources, and, maybe even more importantly, they do not allow to fully protect the intellectual property it owns. Thus, an optimal solution for the board of an enterprise, especially a high-tech one, may be to internalize the market transaction through an opening of own production facilities in the foreign market. This concept, as indicated by Bloningen (2005), has been further developed by Oliver Williamson in his work on transaction costs, and later in a more detailed manner in the OLI (ownership, location, internalization) paradigm coined by John Dunning. According to Dunning (1980), there are three main factors that determine the propensity of a firm to engage in international production in the form of foreign direct investment. The first one is the possession of assets not available for (potential) competitors, or an ability to acquire them on more favourable terms. The second determinant is the enterprise's willingness to internalize its specific assets instead of selling or leasing them to other firms and finally, the third is the profitability of exploiting those resources abroad rather than in the home country. Furthermore, as indicated by Dunning (1980), apart from the special assets already mentioned above, it is necessary for transnational corporations to have additional ownership advantages that outweigh the costs of operating in unfamiliar environment in order to be able to compete with domestic firms in foreign markets. He was also observed that there exist some ownership-specific inputs which may be created by an enterprise itself or purchased with a proprietary right of use from other institutions. They include legally protected right patents, brand names, trademarks, and commercial monopolies in a particular raw material. Following Dunning (1980), those specific inputs arise from the firm's size or its technical characteristics such as the economies of scale and surplus entrepreneurial capacity. Moreover, he showed that the ownership endowment approach is an essential, although not sufficient condition for explaining international production as it will take place only in a situation when existing resource endowments are correctly disposed between countries and there are firms of different nationalities. More precisely, possessed ownership advantages regulate which companies will supply a particular foreign market, while the pattern of location endowments explains the choice of a method with the use of which the enterprise will serve it. It seems to be clear that there are factors encouraging firms to undertake

foreign direct investment which stem from ownership advantages and location advantages. As we discuss the OLI theory, a question arises about the motives that make internalization of ownership endowments attractive for organisations. Dunning (1980) argues that the fundamental incentive to internalize is an attempt to avoid the disadvantages resulting from the market, the price system and the public authority fiat. Additionally, the willingness to capitalize on market imperfections, that always occur in situations when negotiation or transaction costs are high and when it is not possible to fully capture the effects of economies of interdependent activities induces firms to conduct business in the form of foreign direct investment. Likewise, information asymmetries and possession of underutilized resources also constitute important determinants of internalization decisions. Actually, Dunning proposed that absent the advantages arising from internalization, international trade would have replaced much of the FDI carried out in the world.

In recent years, a new stream in the literature on the determinants of FDI have appeared. Following Markusen et al. (1996) and Markusen and Venables (1998; 2000), some researchers have proposed a new endowment-based approach that integrates multinationals into general equilibrium models. This theory assumes that location decisions of entrepreneurs depend on three main types of features: industry characteristics, country characteristics and indirect factors. The first mentioned group of FDI recipient attributes, among other elements, includes factor intensities, increasing returns to scale and product differentiation. The second collection, as indicated by Markusen and Zhang (1999), consists of characteristics such as relative endowment differences and trade costs, while the third comprises public and private infrastructure or legal systems. One of the first examples of a general equilibrium model of foreign direct investment is a two countries, two homogenous goods and two factors (2x2x2) solution presented by Markusen and Venables (1998). In this specification in each of the countries analysed there may exist only two types of firms, either national or multinational. Moreover, the model assumes Cournot competition and free entry. The results show that the most important variables influencing the inflow of capital in the form of FDI are transport costs, plant-level economies of scale, firm-level economies of scale and market size. Markusen and Venables (1998) suggest also that the volume of foreign direct investment increases with the growth of world income. Additionally, the more similar the economies in terms of size and relative factor endowments are, the higher is the multinational firms activity. However, in the earlier research paper by Markusen et al. (1996), two different kinds of foreign direct investment were distinguished, specifically: horizontal FDI and vertical FDI. In this work it was shown that in a situation when countries are similar in size but vary substantially in relative factor endowments, vertical multinationals are proved to dominate production. On the other hand, when high trade costs are accompanied with significant similarities between the countries in size and relative factor endowments, then the supremacy of horizontal multinationals is being observed.

At the beginning of the 21st century several authors, from among which the most influential one appears to be P. Krugman (1991), have come up with a new theory of location choices, nowadays commonly known as the New Economic Geography (NEG). The central component of this theoretical framework is the endogenous agglomeration of industries, which is an effect of the interaction between increasing returns to scale and transport costs. Those two elements serve as a motivation for firms to concentrate production in a single plant located close to the final demand. Furthermore, they constitute

an incentive for the consumers to cluster in the areas characterized by the largest number of product varieties being manufactured. Consequently, it follows that the major determinants of the foreign investor location choice are market access and production costs. Hence, in a nutshell, the New Economic Geography predicts that FDI inflows are positively influenced by perceived volume of demand and negatively by production costs and the intensity of local competition. However, it seems to be necessary to point out that NEG theory deliberately omits certain types of non-pecuniary externalities that can actually be important in the real world. One example here may be knowledge spillovers. Those effects have a potential to generate additional agglomeration effects and thus impact the productivity of firms. This in turn means that the overall effect of competition on foreign direct investment location decisions is ambiguous. On the one hand due to the existence of spillovers an incentive arises for multinationals to cluster with other companies in the same industry, but on the other hand increased competition motivates foreign firms to locate in markets with fewer competitors. Clearly, further research will be required to answer the question, which one from these two forces is the one that dominates.

Another approach to the issue of the determinants of foreign direct investment inflows has been proposed by Bloningen and Piger (2011). The focus of the paper is on the linear regression model. In order to confront the significant uncertainty present in the empirical studies of bilateral FDI patterns in terms of the set of covariates that should be included in the estimated equation, Bayesian Model Averaging (BMA) is employed. Bloningen and Piger (2011) concentrate on cross-sectional patterns for the year 2000. The estimation is done both in levels and in logarithms, which are employed because of skewness that is observed in the FDI variable. The researchers also specifiy a regression in first differences for the time period between 1990 and 2000 as to control for bilateral-country-pair fixed effects. The results suggest that the set of true determinants of foreign direct investment inflows includes gravity variables, cultural distance, parent-country per capita GDP, relative labour endowments, and regional trade agreements. What is more, it was shown that host country government policies regarding multilateral trade openness, business costs, infrastructure, and institutions, have little impact on the amount of FDI located in a particular country, except from often negotiated bilateral agreements. In general, it can be concluded that many from among the variables suggested as significant determinants of FDI flows by previous studies are found not to be robust.

The above analysis shows that quite recently considerable attention has been paid to the research on the determinants of foreign direct investment. It is also prominent that the literature documenting this issue presents a variety of theoretical approaches. However, to the author's best knowledge, the factors influencing location decisions of multinational firms have been scarcely investigated from the sectoral point of view. One of the first publications that address the problem of FDI from this particular perspective is Walsh and Yu (2010). Their main objective is to analyse the impact of different macroeconomic, developmental and institutional factors on the volume of foreign direct investment received by emerging market countries and compare it with the set of determinants characteristic for developed economies. It is expected that the circumstances that attract foreign investors to more advanced countries would differ from the ones that motivate multinational enterprises to locate capital in emerging markets. In this work, the researchers use a dataset which classifies FDI according to the sectoral division of the economy. This means that the data breaks down foreign direct

investment inflows into three groups, namely into primary, secondary and tertiary sector investments. In order to eliminate the endogeneity concerns a dynamic Generalized Method of Moments (GMM) is employed. The set of independent variables includes openness, GDP growth, average inflation over the three previous years, the logarithm of GDP per capita, logarithm of real effective exchange rate and FDI stock. Walsh and Yu (2010) suggest that the only determinant of FDI flows that is significant from the perspective of all the three sectors is the clustering effect. They also consider the effect of qualitative explanatory variables such as a measure of labour flexibility, infrastructure quality, financial depth, judicial independence, legal system efficiency, and enrolment rates for primary, secondary, and tertiary education are taken into account. What is more, Walsh and Yu (2010) distinguish between developed and developing economies. The results they obtained indicate little importance of macroeconomic variables to primary sector investment. Notwithstanding, from the estimation carried out it follows that advanced economies attract much less FDI than emerging markets, provided the depth of financial markets in both types of countries is similar. Improved infrastructure induces more secondary sector FDI, but only into emerging markets. Moreover, the researchers have demonstrated that while in developing economies the volume of foreign direct investment in services is not in any way strongly affected by macroeconomic factors, in developed countries those variables are fundamental for the amount of inward FDI. In particular, the exchange rate and existing FDI stock are positively correlated with capital inflows. What is more, it was shown that in those economies, the lower the levels of GDP per capita, the more tertiary investment is attracted. They have also observed a linkage between the quality of infrastructure and the amount of FDI in the services sector. Regardless of whether the country is a developed one or an emerging market, better infrastructure leads to a higher volume of tertiary foreign direct investment. Interestingly, educational attainment turned out not to be related to any of the sectoral FDI types. Due to the fact that it is only proxied with enrolment rates, definitely further research will be needed in order to verify if this is a firm conclusion or rather a result of inadequate data.

The literature on the factors affecting location decisions of multinational corporations in the transition economies of Central and Eastern Europe (CEE) is quite abundant. The focus of this research is mainly on the comparison of the circumstances for FDI placement in distinct countries of the region and on the identification of the causes of substantial differences in the amount of inflows to those economies. Thus, for the purpose of this study an analysis of the available literature on the determinants of inward foreign direct investment in Central and Eastern European transition countries is presented.

According to Lankes and Venables (1996), FDI makes it possible for the countries in transition to become integrated into the global economy in an effective way. This is mostly because of the fact that it is a source not only of financial capital, but also of technology and management know-how, which are essential for the local firms to initiate and implement the restructuring process, but scarce in the host economies. Moreover, according to Borensztein and DeGregorio (1998), spillover effects of advanced technologies induce the occurrence of a positive correlation between FDI inflows and economic growth of the receiving country. Consequently, it is necessary for the governments of states undergoing a transition process to introduce an efficient policy that would attract foreign investors to locate their capital there. Kinoshita and Mody (2001) show that the set of the main determinants of location choices of multinational corporations includes either the classical factors of comparative advantages, or

agglomeration economies. The first one from the groups mentioned, comprises variables such as market size, low wages, skilled labour force, and infrastructure, which, in fact, are specific to each country.

In recent years, the research on the factors affecting the volume of foreign direct investment inflows to the Central and Eastern European countries, especially the ones that joined the European Union (EU) in and after the year 2004, has become very popular. One of the first comprehensive studies on this issue was the one by Kinoshita and Campos (2003). In a panel data analysis, they investigate the set of country characteristics and agglomeration effects that influenced the amount of FDI received by 25 transition economies between 1990 and 1998[17]. In order to explain the uneven spatial distribution of FDI across the countries considered they use two different models. First the Fixed Effects Model is employed and then the Generalized Method of Moments (GMM). The focus of the research is on transition specific determinants of foreign direct investment inflows, on the location-specific advantages of host countries and also on the agglomeration effect of foreign direct investment. The results of fixed effects regression offered by Kinoshita and Campos (2003) suggest that the FDI into transition economies is mostly market-seeking. Nonetheless, from the GMM model it follows that market size variable is insignificant and the most fundamental factor determining foreign direct investment inflows in the transition economies is the agglomeration effect. Low labour costs in the host country also attract foreign capital. Another significant determinant of FDI is the abundance of natural resources. Furthermore, poor public institutions and low quality bureaucracy, negatively affect the volume of FDI received by each country. Kinoshita and Campos (2003) have also demonstrated that the greater the openness to trade, the higher the volume of capital located in the form of foreign direct investment. Therefore, the claim of trade and FDI complementarity has been confirmed. What is more, it appears that the restrictions on capital inflow constitute a significant deterrent to inward foreign direct investment.

Another concept has been demonstrated by Carstensen and Toubal (2003). Using dynamic panel data methods they investigate the determinants of foreign direct investment inflows in Central and Eastern European Countries (CEECs). More precisely, the researchers estimate regression equations with the use of generalized method of moments technique and they obtain the Arellano and Bond (1991) estimator. The panel consists of ten OECD reporting countries, namely, Austria, Belgium (combined with Luxembourg), Denmark, France, Italy, Germany, Portugal, Spain, UK, USA, and seven destination countries located in Central and Eastern Europe, in particular, Bulgaria, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic and Slovenia. The investigation is conducted for the time period 1993-1999. As the Sargan test and the Arellano and Bond (1991) m test for autocorrelation have shown that at any conventional significance level there is no reason to reject the null hypothesis of no autocorrelation, it can be concluded that the use of GMM method is adequate for the described data. The results suggest that from among the variables regarded as typical determinants of FDI flows, high market potential and comparative advantages such as low relative unit labour costs, and relative endowments significantly influence the location decisions of multinationals. Moreover, the authors argue that the observed negative correlation between trade costs and the volume of capital inflows indicates complementarity of trade and foreign direct investment. They also show that inward FDI in CEECs is

[17] Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, the Czech Republic, Estonia, Macedonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovakia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.

strongly affected by transition-specific factors. In particular, both the level of privatisation and the method of privatisation positively affect the amount of resources invested in the region by transnational corporations. Another determinant of FDI of crucial importance is the country risk associated with legal, political and economic environment. As reported by Carstensen and Toubal (2003), it is a substantial deterrent of foreign direct investment inflows. What is more, the states located in Central Europe are the most successful ones in the group of transition economies when it comes to attracting FDI due to high market potential and stable legal and economic environment observed in those countries. In conclusion, the research done by Carstensen and Toubal (2003) demonstrates that the factors perceived as traditional determinants of FDI inflows to CEE countries significantly and in a believable manner influence the volume of resources invested in those economies. Furthermore, transition-specific factors affect inward foreign direct investment into the countries investigated in the discussed paper.

One interesting solution to the problem under scrutiny in this paper is presented by Krkoska (2002). In his analysis of the distribution of foreign direct investment in transition economies of Central Europe compared with emerging markets benchmarks between the years 1990 and 2000, he obtains results consistent with the theoretical predictions. Firstly, he arrives at a conclusion that gravity factors have been fundamental determinants of FDI inflows especially in the Czech Republic, Hungary and Poland, the Central European countries that actually received the highest volume of foreign capital in the form of FDI in the period under scrutiny. Moreover, Krkoska (2002) finds that also market size and natural resources endowment are of crucial importance for the entrepreneurs when choosing the country of location for a foreign affiliate of the company. Next relevant point is the impact of privatisation on FDI in transition countries. Krkoska (2002) shows that a large share of foreign direct investment in Central European states indeed has been created by this process, particularly in Hungary, Poland and Russia.

The results obtained by Bevan and Estrin (2004) generally confirm the conclusions presented above. In a panel data study they investigate determinants of bilateral foreign direct investment flows from the Western countries, which are the major FDI suppliers[18], to the economies located in Central and Eastern Europe[19]. The dataset used for this investigation concerns the time period 1994-2000. With the use of random effects regression the researchers have found that gravity factors significantly influence foreign direct investment flows. Specifically, they have shown that FDI is positively correlated with the level of source and host country GPD and negatively with the distance between the investor and the recipient. Moreover, Bevan and Estrin (2004) have demonstrated that the coefficient for unit labour cost as a determinant of foreign capital inflows is negative, independent of the distance between countries or the host size. However, it was also shown that relative capital costs do not have a significant impact on FDI. The most likely explanation is probably the fact that since the level of development of capital markets in the economies in transition is rather low, foreign investors rely mainly on their own resources and obtain necessary funds from the financial markets in their countries of origin. Furthermore, in the discussed work surprisingly high foreign direct investment flows from the states in Western Europe that have not previously been important sources of FDI to particular CEECs were observed because of the existing differential in real unit labour costs and relative closeness between

[18] EU-14 with Belgium and Luxembourg merged, Korea, Japan, Switzerland, the USA.
[19] Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic, Slovenia, Ukraine.

them. An example here may be such country pairs as Germany and Poland, the Czech Republic, or Hungary and Austria, as well as Finland and Estonia. Bevan and Estrin (2004) also arrive at a conclusion that foreign direct investment and trade are complementary phenomena. Nonetheless, it is necessary to point out that the above outcome is valid only in the lagged specification of the model, meaning that current resources location decisions of multinationals are influenced predominantly by past rather than by contemporaneous information about potential host economies. Another finding is that inward FDI to transition economies is not significantly affected by market valuations of country-specific risk. One possible explanation here can be the inclusion of risk factor in other variables in the regression equation. Moreover, Bevan and Estrin (2004) have proposed a model which takes into account the influence of the EU accession announcements on the type of factors determining foreign direct investment volumes in the countries under investigation. It suggests that host and source country GDP positively influences FDI levels, whereas distance and unit labour costs, diminish them. Furthermore, it was shown that an announcement regarding potential accession to the EU has got a significant and positive effect on the foreign capital inflow into transition economies, even when gravity factors and factor costs are controlled for. The reason here is enhanced creditworthiness resulting from the declaration of willingness to join the European Union. What is more, it was demonstrated that the EU membership will further accelerate the inflows of foreign direct investment inflows to transition economies located in Central and Eastern Europe and this in turn is expected to lead to more growth and development in those countries.

Another approach to the issue of FDI determinants in Central and Eastern Europe has been proposed by Janicki and Wunnava (2004). In this work the authors explore it from the perspective of now mostly former, but at the time of the research current, European Union accession candidates. The study investigates the factors influencing bilateral foreign direct investment between the EU-15 states[20] and nine central and east European economies in transition awaiting to join the Community, namely Bulgaria, the Czech Republic, Estonia, Hungary, Poland, Romania, Slovakia, Slovenia and Ukraine. In order to eliminate the problem of heteroscedasticity the Weighted Least Squares (WLS) method is employed. The set of variables tested consists of: openness of the country, log value of GDP, labour cost and institutional investor country risk rating, which reflects the host country's safety from default. The findings of Janicki and Wunnava (2004) suggest that FDI inflows into the CEE economies are determined by market size, host country risk, lower labour costs and openness to trade. In line with expectations the estimated model predicts a positive coefficient on market size variable. However, the relationship is not linear. This outcome means that the volume of FDI received will be increasing with the size of the economy, but at a decreasing rate. Host country risk, is also proved to positively affect inward foreign direct investment in Central and Eastern Europe. Simply speaking, the healthier is the economic and political environment in a particular recipient country, the more foreign capital will be located there. Another variable of high statistical significance that exerts positive impact on FDI is the labour costs differential between the EU members and the CEECs as cheaper labour makes it possible for multinational firms to reduce their production costs. Perhaps the most important determinant of foreign direct investment inflows is however a country's openness to trade.

[20] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Ireland, Luxembourg, the Netherlands, Portugal, Spain, Sweden, the United Kingdom.

It can easily be noted that after the enlargement processes of the year 2004, 2007 and 2013, most of the countries situated in the Central and Eastern Europe are members of the European Union. As it was indicated by Janicki and Wunnava (2004), it appears that the announcement and later the actual accession to the Community had a statistically significant and quantitatively important influence on the volume of foreign direct investment inflow to each of the candidate states. Clausing and Dorobantu (2005) confirm this hypothesis by showing that prospective EU membership had a positive impact on FDI in Central and Eastern Europe. The main reason for this phenomenon to occur is an improved risk environment and the perspective of future barrier-free access to the common market that arise from the candidacy, and more importantly, from the announcement of future accession to the EU. This outcome is in line with theoretical predictions concerning the location decisions of profit maximizing multinational firms. Moreover, the researchers have arrived at a conclusion that foreign direct investment has played a crucial role especially in the countries undergoing transition from centrally planned to free market economy due to the fact that it provided the stable resources of investment funds and expertise.

Previous studies have demonstrated what the most significant variables are that affect the FDI inflows into Central and Eastern European countries. Here a question arises whether there is a substantial difference between the economies in Eastern and Western Europe in terms of the set of factors influencing the volume of received foreign direct investment. Recently, several publications have appeared that explore this issue. One of the examples is Disdier and Mayer (2004) who investigate the determinants of investment location decisions of French multinational firms in those two parts of Europe. The dataset consists of 1843 location choices in 13 European Union states and in 6 CEECs, namely in Bulgaria, Hungary, Poland, Romania, Slovenia and ex-Czechoslovakia, in the time period from 1980 to 1999. The researchers employ the conditional logit model (CLM) of McFadden with a qualitative dependent variable. As reported by Disdier and Mayer (2004) the selection of locations made by investors are expected to have a nested structure. This means that firstly a region within Europe is chosen for FDI and subsequently a specific country situated in this area. Thus, it seems obvious that the two choices are interdependent. What is more, the authors employ the nested logit model (NLM) in order to estimate the influence of distinct variables on the choice of a particular country within each nest, namely Eastern Europe and Western Europe, by French multinational firms. Disdier and Mayer (2004) indicate a high degree of similarity when it comes to FDI determinants inside the investigated group of economies in the period between 1991 and 1999. They show that competition among countries to attract higher volumes of FDI occurred more frequently within the group of CEE states or within the group of EU member states, than between those groups. This outcome suggests that over the time the difference in attractiveness between Eastern and Western European countries as host economies for foreign direct investment has decreased, leading to increased substitutability of the two regions. Additionally, Disdier and Mayer (2004) arrive at a conclusion that the main determinants of FDI inflows are market size and agglomeration effects. Institutional factors are also found to be significant. Those variables are of crucial importance for the explanation of discrepancies between the East and the West of Europe in their attractiveness as potential locations for FDI. When the model controls for the institutional characteristics of host countries, then the determinants of FDI undertaken by French multinational firms do not differ substantially inside Eastern Europe and among the EU member states. In fact, regional policies play a

rather minor role as the factors influencing location decisions of corporations in the European Union. With the enlargement of the EU, institutions in the CEE economies are evolving towards the standards characteristic for the community members. However, the financial support for lagging regions required for them to enforce substantial reforms is implemented gradually with the progress of the accession process. Notwithstanding, as indicated by Disdier and Mayer (2004) the distribution of affiliates among and within the Central and Eastern European countries is still highly unequal.

The above summary shows that much research has been done on the determinants of foreign direct investment location decisions of multinational corporations in Central and Eastern Europe. Considerable attention has been paid especially to the factors influencing the volume of inward FDI in transition economies that recently became member countries of the European Union. In each of the papers the focus of the authors was on the country specific determinants of foreign direct investment location decisions. What seems to be even more important, all the described studies aimed at comparing the sets of explanatory variables identified as significant for the amount of FDI flows received by various countries due to a willingness to explain the differences in foreign capital distribution among the CEECs.

As it has been already explained above, in recent years the determinants of foreign direct investment flows have been widely investigated. However, to the author's best knowledge very few up-to-date publications are available in the literature that address the issue of the factors influencing FDI inflows to central European countries. In particular, little attention has been given to the impact of the last financial and economic crisis on the determinants of location decisions of multinational firms in CEECs. Comprehensive studies concerning the issue of the factors affecting FDI flows in the time period between 2008 and 2014 are still lacking. Specifically, the attractiveness for potential foreign investors of various countries that underwent transition process ought to be investigated. Thus, further research on the problem of foreign direct investment determinants in recent years would definitely be of interest. What is more, the effects of the accession of the central European transition economies to the European Union should also be explored. It seems to be clear that the process of integration into the Community should have a significant impact on the amount of foreign direct investment located in those countries. This is mostly due to the fact that through a GDP growth and reduction in trade costs such as transportation costs and tariffs it led to a substantial expansion of CEE countries market potential. However, the accession to the EU reduces the differences between the economies located in Central and Eastern Europe and the EU-15 in terms of unit labour costs. This in turn is expected to decrease the inflows of vertical FDI and increase inward horizontal FDI from the founding European Union members to the countries that joined the community in the year 2004 and afterwards.

On the basis of the literature survey, hypotheses regarding the influence of the independent variables included in the panel data model estimated in this study can be drawn. Table 2 summarizes the predictions. As follows from this table, foreign direct investment inflows to central European countries in the time period 2004-2013 are expected to be positively affected by GDP, GDP growth, real exchange rate, imports as a share of GDP, km of railways per 100 km^2, km of roads per 100 km^2. Simultaneously, a negative impact of corporate tax rate, lending interest rate and labour cost on inward FDI index is predicted to occur.

Table 2. Hypotheses regarding the influence of the chosen set of independent variables on the foreign direct investment inflows to central European countries in the time period 2004-2013 drawn on the basis of the conducted literature review.

Variable name	Variable label	Hypothesis
market_size	GDP	Positive influence on FDI inflows
market_growth	GDP GROWTH	Positive influence on FDI inflows
exchange_rate	REAL EXCHANGE RATE	Positive influence on FDI inflows
imports_GDP	IMPORTS AS A SHARE OF GDP	Positive influence on FDI inflows
CTR	CORPORATE TAX RATE	Negative influence on FDI inflows
labour_cost	LABOUR COST	Negative influence on FDI inflows
country_risk	LENDING INTEREST RATE	Negative influence on FDI inflows
railways	KM OF RAILWAYS PER 100 SQUARE KM	Positive influence on FDI inflows
roads	KM OF ROADS PER 100 SQUARE KM	Positive influence on FDI inflows

Source: own analysis of the literature on FDI.

In conclusion, a further study on the determinants of FDI inflows to the countries located in the centre of Europe is still required. Thus, in my research I intend to concentrate on the factors that affected the inward foreign direct investment volumes in the central European transition economies in the time period between the years 2004 and 2013.

CHAPTER III

Dataset description

The dataset constructed for the purpose of this research on the inflow of foreign direct investment to central European countries between 2004 and 2013 consists of 100 observations and 13 variables of various type. The full list of variables included in the analysed data is reported in Table 3. From this table it can be seen that the panel variable in the described dataset is country number (country_no). The main reason for this is the fact that the "country" variable is a string variable, and thus it was necessary to convert it to a numeric one. The analysis in this study is carried out for ten central European countries, particularly for Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. The time variable in the discussed model is "year". It is ranging from 2004 to 2013. The panel used for this study is strongly balanced, meaning that all the countries have data for all years. The dependent variable in the estimated regression are foreign direct investment (FDI) inflows. The information shown in the table indicates that it is continuous. The set of explanatory variables consists of nine elements, namely: market size, market growth, exchange rate, imports as a share of GDP, corporate tax rate, labour cost, country risk, kilometres (km) of railways per 100 square kilometres and kilometres (km) of roads per 100 square kilometres. The last two regressors mentioned indicate the level of infrastructure development in a particular country investigated in this study. As it can be seen from Table 3, all of the explanatory variables mentioned are as well continuous.

Table 3. Variables included in the estimated model.

No.	Variable	Label	Type of variable
1	Country	COUNTRY	Object, string
2	country_no	COUNTRY NUMBER	Object, discrete
3	Year	YEAR	Time, integer-valued
4	FDI_inflows	FDI INFLOWS IN US$	Dependent, continuous
5	market_size	GDP	continuous
6	market_growth	GDP GROWTH	continuous
7	exchange_rate	REAL EXCHANGE RATE	continuous
8	imports_GDP	IMPORTS AS A SHARE OF GDP	continuous
9	CTR	CORPORATE TAX RATE	continuous
10	labour_cost	LABOUR COST	continuous
11	country_risk	LENDING INTEREST RATE	continuous
12	Railways	KM OF RAILWAYS PER 100 SQUARE KM	continuous
13	Roads	KM OF ROADS PER 100 SQUARE KM	continuous

Source: own elaboration.

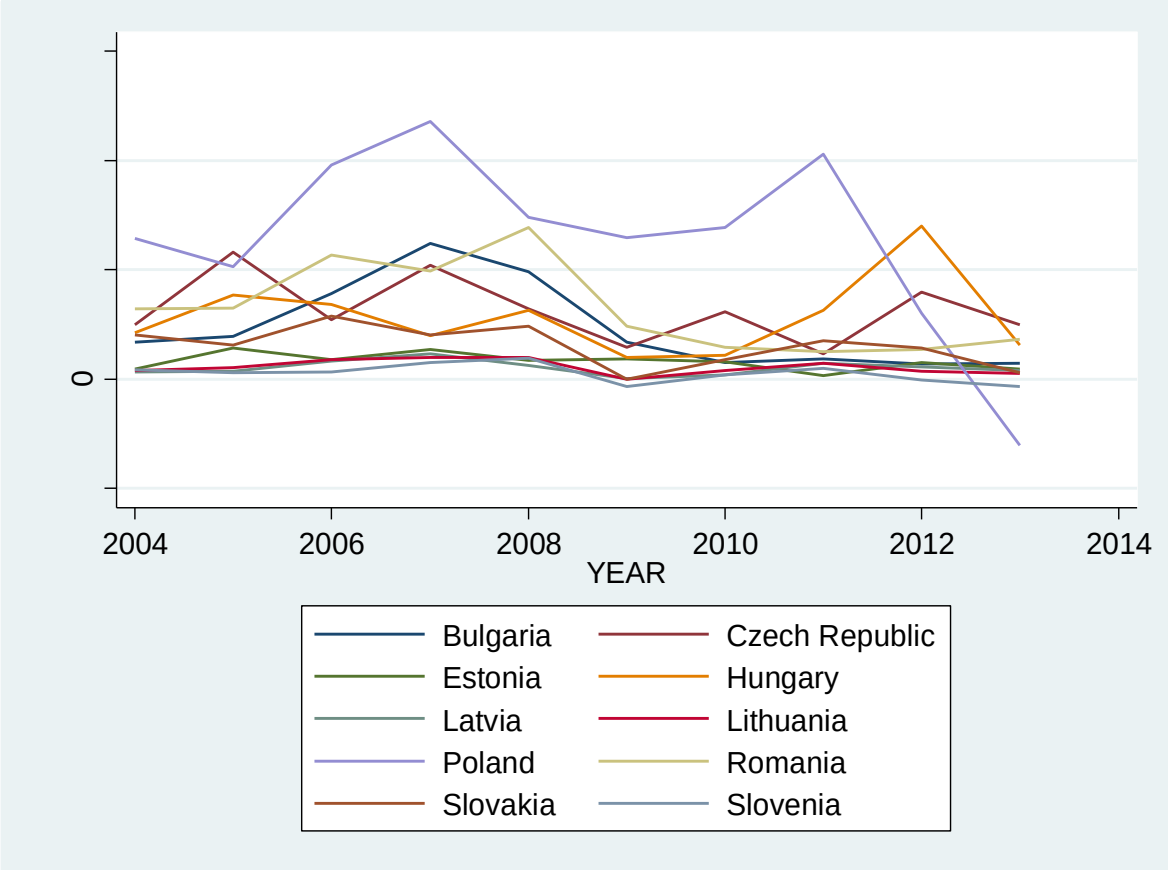
The dependent variable in the investigated panel data model is foreign direct investment inflows (FDI_inflows). The data used in the regression come from the dataset on "Inward and outward foreign direct investment flows, annual, 1970-2013" published in the United Nations Conference on Trade and Development online statistical warehouse (UNCTADstat). In the discussed model FDI inflows are measured in US dollars at current prices and current exchange rates. Following the data presented in Table 4, in the time period under scrutiny, foreign direct investment inflows to all of the analysed central European countries varied between -6040 mln USD (Poland, 2013) and 23600 mln USD (Poland, 2007). The annual difference in inward FDI for each of the countries ranged from 548 mln USD to 12900 mln USD. At the same time, the within foreign direct investment inflows, which refer to the deviation from individual country's average, varied between -14600 mln USD to 15000 mln USD. The mean value of the explained variable in the described sample was 4340 mln USD.

Table 4. Foreign direct investment inflows descriptive statistics.

Variable	Mean	Standard deviation	Minimum	Maximum	Observations
FDI_inflows overall	4.34e+09	4.96e+09	-6.04e+09	2.36e+10	N = 100
FDI_inflows between		3.77e+09	5.48e+08	1.29e+10	n = 10
FDI_inflows within		3.42e+09	-1.46e+10	1.50e+10	T = 10

Source: own STATA calculations.

Fig.4. FDI inflows to central European countries in the time period 2004-2013.



Source: own STATA calculations.

A visual representation of foreign direct investment inflows to the ten investigated central European countries between 2004 and 2013, is presented in Fig.4. This graph shows that the set of economies that attracted the highest amounts of FDI throughout the analysed time period includes Poland, Hungary, the Czech Republic and Romania. Moreover, from the figure it can be seen that in the year 2004, and later between 2006 and 2011, Poland was the top receiving country in the sample. In 2005, from among all the examined economies, more FDI was located only in the Czech Republic. In 2008, however, inward foreign direct investment to Poland declined considerably as compared to 2007. A sharp downward trend in foreign direct investment inflows occurred also in 2012 and was followed by a substantial divestment in 2013. Consequently, from the top receiving country Poland became an economy with the lowest inward FDI in the analysed sample. Simultaneously, the Czech Republic, Romania and Hungary maintained their positions as the leading locations for foreign direct investment in central Europe. This figure also indicates that in the investigated time period Latvia, Slovenia, Estonia and Lithuania were the countries characterized with the lowest FDI inflows in the sample. What is more, the Czech Republic was the economy, where inward foreign direct investment was fluctuating the most in the analysed time period. For more detailed graphical representation of inward FDI to central European countries the reader is referred to the appendix.

The maximum, the minimum and the average values of annual foreign direct investment inflows to the countries under investigation in this research are presented in Table 5. It is worth noting that both the highest and the lowest amounts of capital located in the form of FDI were recorded for Poland. The largest inflow of foreign direct investment, equal to approximately 23561 mln of US dollars, was received by this particular country in the year 2007. In 2013 a divestment of nearly 6038 mln USD was reported and Poland lost its position as one of the leading FDI receiving countries in the central European region.

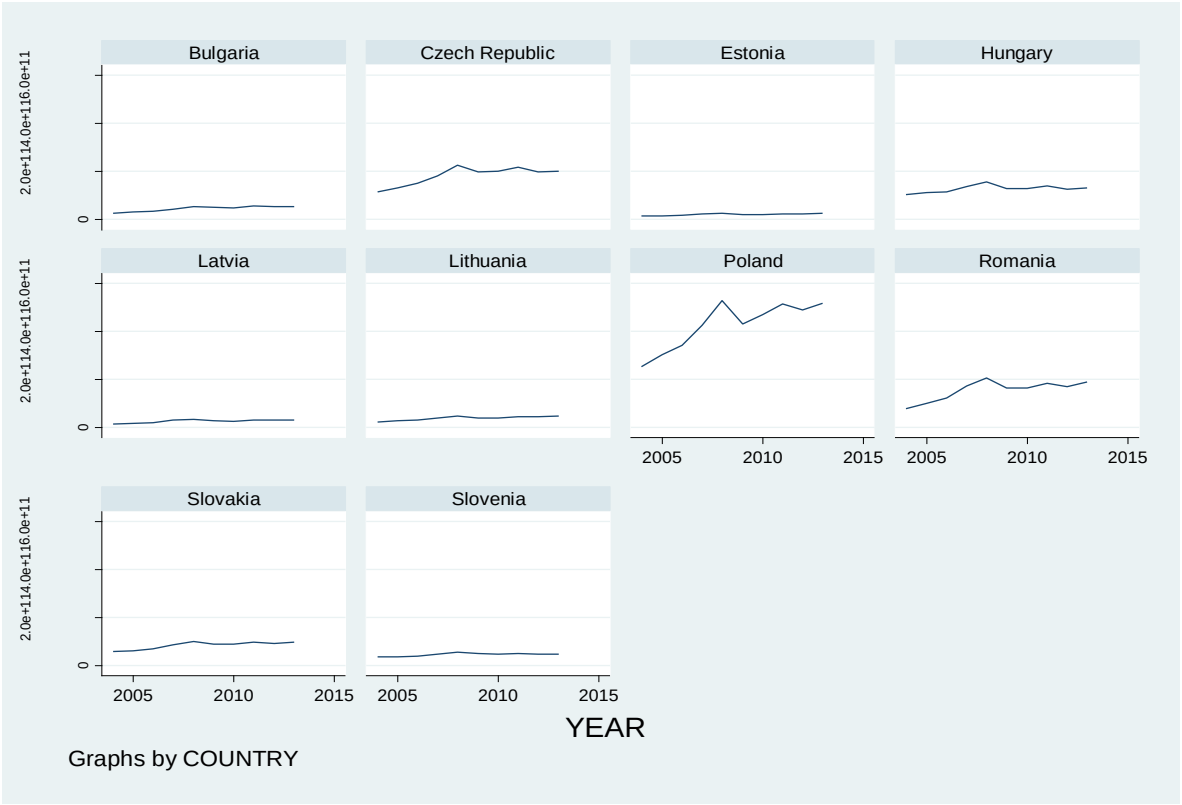
Table 5. Maximal, minimal and average FDI inflows in US dollars, by country.

COUNTRY	MAXIMUM	YEAR	MINIMUM	YEAR	AVERAGE
Bulgaria	12388858778	2007	1375245909	2012	4695065179
Czech Republic	11653247013	2005	2317553784	2011	6334469579
Estonia	2869315023	2005	340476335	2011	1631605239
Hungary	13983345377	2012	1994606737	2009	5662946128
Latvia	2322323041	2007	93937296	2009	1044718630
Lithuania	2015013492	2007	-13719641	2009	1106332035
Poland	**23560757962**	**2007**	**-6037739431**	**2013**	**12861464093**
Romania	13908521624	2008	2522148313	2011	6478655727
Slovakia	5803086280	2006	-6079103	2009	3049884495
Slovenia	1947485993	2008	-678581813	2013	548046147

Source: own calculations based on UNCTAD data.

As it has already been mentioned in the beginning of this chapter, the set of explanatory variables consists of nine variables, namely: market size, market growth, exchange rate, imports as a share of GDP, corporate tax rate, labour cost, country risk, kilometres (km) of railways per 100 square kilometres and kilometres (km) of roads per 100 square kilometres. Below the author gives a comprehensive description of listed independent variables and provides graphical representation of the changes to those variables that occurred in the investigated time period for each of the ten central European countries included in the discussed sample.

Fig. 5. Market size in current US dollars in the time period 2004-2013, by country.

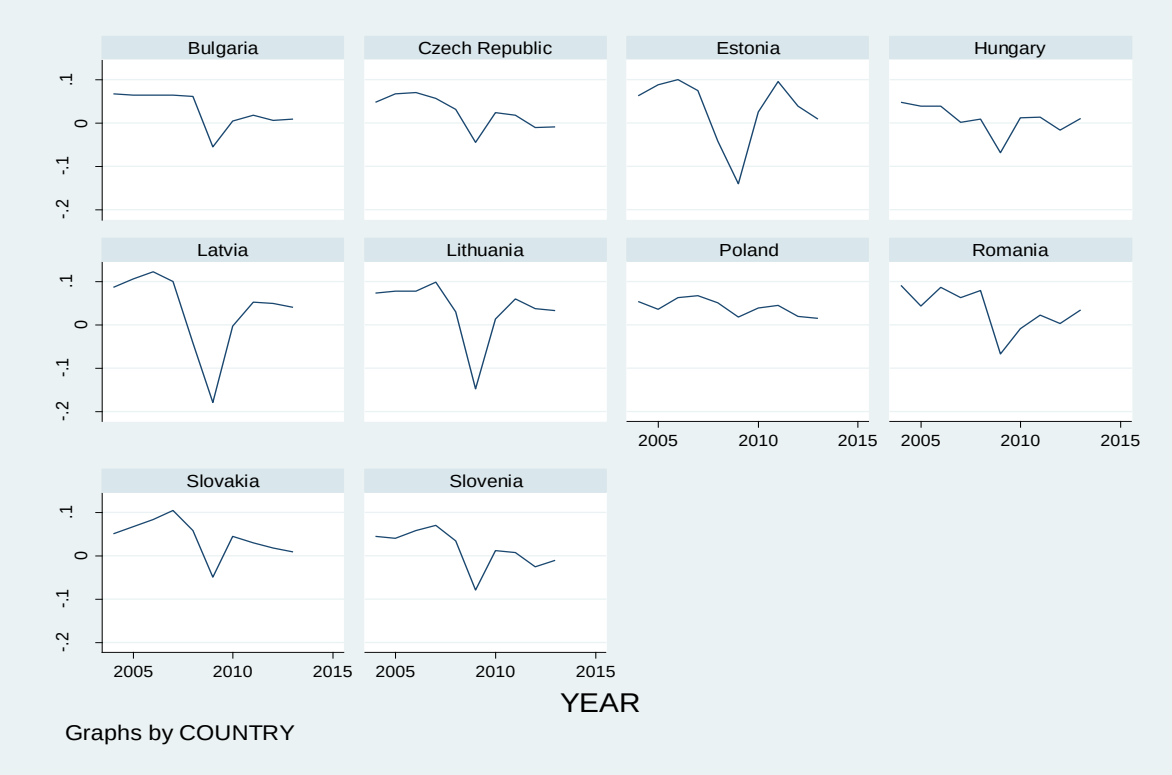


Source: own STATA calculations.

Following the information presented in graphs in Fig.5 it can be concluded that throughout the whole analysed time period Poland was the biggest central European country in terms of market size. The next economies with the highest GDP values were the Czech Republic, Romania and Hungary. Considering the trends prevalent in the countries under scrutiny, it can be said that in Bulgaria, Estonia, Latvia, Lithuania, Slovakia and Slovenia between 2004 and 2013 market size was stable. All of these economies in the time period 2004-2008 experienced a slight upward trend in GDP. Improvements as compared to previous year appeared also later in 2011 and 2013. The years 2009-2010 and 2012, on the other hand, brought a decrease of market size in all these countries. The highest GDP level for Latvia, Lithuania, Slovenia and Slovakia was reported in 2008, whereas for Bulgaria and Estonia in 2013. In the Czech Republic a significant increasing trend in GDP occurred in the time period 2004-2008. In 2009, however, the country suffered a slight decrease in market size. A little rebound was observed between 2010 and 2011. It was followed by a decline in 2012 and a minor improvement in

GDP level in 2013. In Hungary and Romania all the noticed changes in market size had the same direction in specific years as in the Czech Republic, but they were of a different magnitude. In Hungary the fluctuations of gross domestic product were lower, but in Romania they were higher. In the case of Poland a significant increasing trend in GDP was observed between 2004 and 2008. 2009 brought a substantial decrease as compared to the previous year. In 2010 and 2011 an the country experienced an improvement in market size, but to a lower extent than in the years 2004-2008. This boost was followed by a slight decline in GDP in 2012, however in 2013 it grew modestly and was back on its 2011 level. The data on gross domestic product come from the database of the World Bank and they are expressed in current US dollars.

Fig. 6. Market growth rate at market prices in the time period 2004-2013, by country.



Source: own STATA calculations.

Another explanatory variable used in the discussed study is market growth. It is represented by annual growth of gross domestic product of each of the countries under investigation. The data for the time period 2004-2013 are obtained from the online database of the World Bank (http://data.worldbank.org). The annual growth rate of GDP is measured in market prices based on constant local currency. All of the aggregates used to calculate it are based on constant 2005 US dollars. The panel data line plots of market growth rate for each of the ten central European economies under scrutiny are displayed in Fig.6. From this visual representation it follows that for all of the investigated countries declines in the GDP growth rate coincide with the years of the deepest economic dowturn. Moreover, in the majority of examined countries, the biggest fall in market growth occurred in 2009. The most severe were the declines observed in Estonia, Latvia and Lithuania.

The highest and the lowest values of GDP growth rate for each economy analysed in this study are shown in detail in Table 6. The information given there indicates that the highest market growth rate was reported for Latvia in the year 2006 and amounted to 12.23%. The lowest GDP growth rate equal to – 17.95% was also noted in this country, but in 2009. One interesting case in the described sample is Poland. As it can be seen in Table 6, this is the only country from among all the examined for which the lowest recorded level of market growth rate in the time period 2004-2013 was positive (+1.57%). The main reason for this were large infrastructural projects related to the organisation of UEFA Euro 2012 football championships carried out in the years 2008-2012. Those investments, which included construction of stadiums, roads, express roads, highways, airports, railways and railway stations, as well as hotels and restaurants, ensured the inflow of foreign capital in the time of crisis.

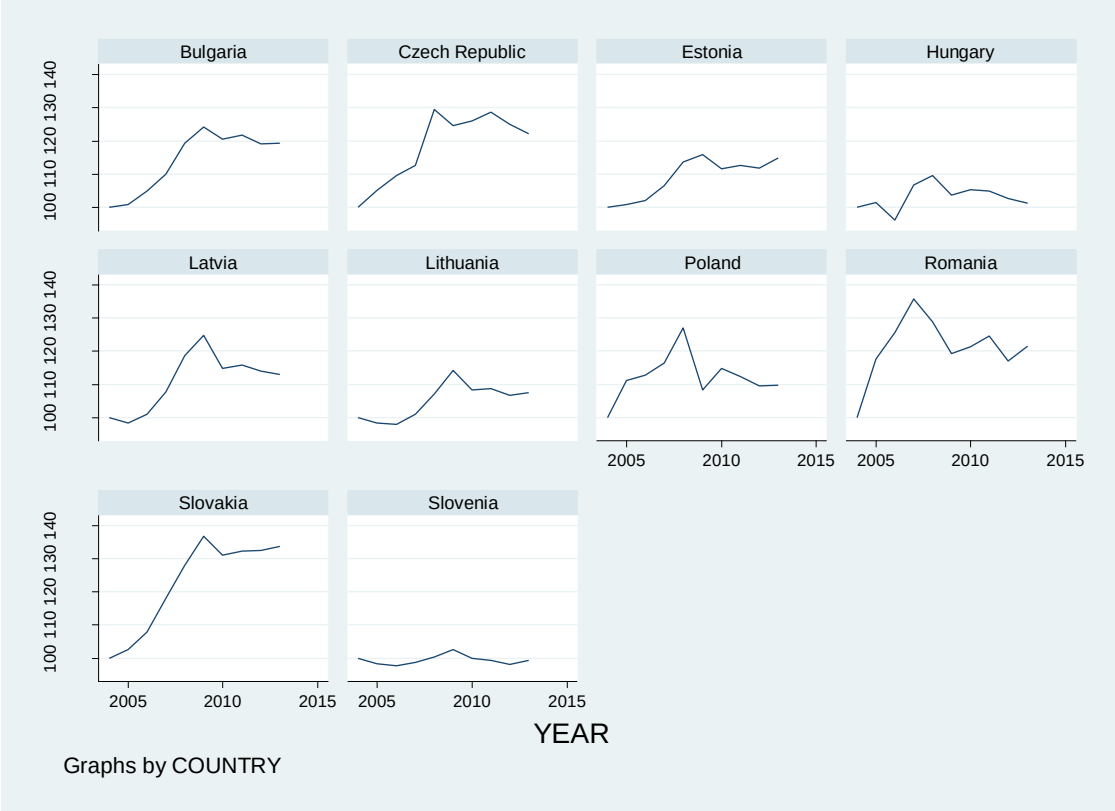
Table 6. The highest and the lowest GDP growth rates in the time period 2004-2013.

Country	Highest GDP growth rate	Year	Lowest GDP growth rate	Year
Bulgaria	+6.7%	2004	-5.5%	2009
Czech Republic	+7.02%	2006	-4.51%	2009
Estonia	+10.1%	2006	-14.1%	2009
Hungary	+4.8%	2004	-6.8%	2009
Latvia	**+12.23%**	**2006**	**-17.95%**	**2009**
Lithuania	+9.84%	2007	-14.74%	2009
Poland	**+6.79%**	**2007**	**+1.57%**	**2013**
Romania	+9.12%	2004	-6.8%	2009
Slovakia	+10.49%	2007	-4.94%	2009
Slovenia	+6.96%	2007	-7.94%	2009

Source: own elaboration.

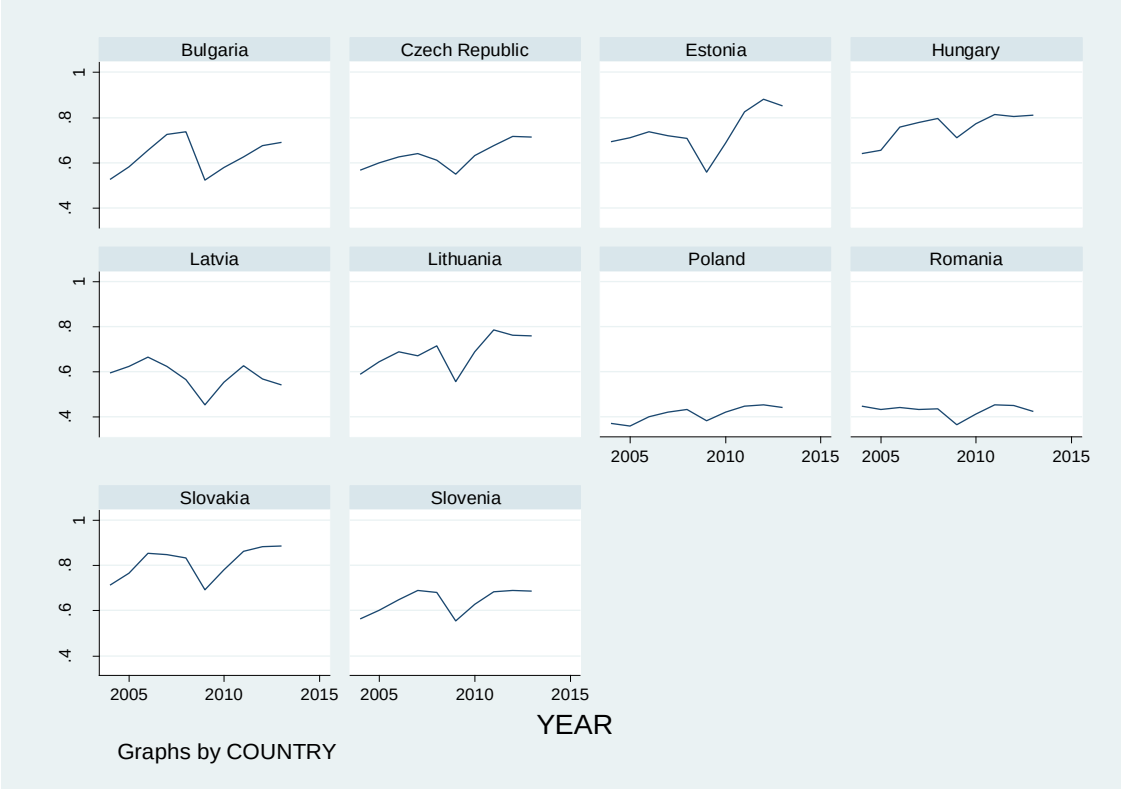
The next regressor to be considered is exchange rate. In the dataset used for the purpose of the study, it is expressed by real effective exchange rate in consumer price indices. The data on this variable come from the online database of EUROSTAT. As follows from the graphs presented in Fig.7, the real exchange rate was most stable in Slovenia. In this particular country, throughout the whole time period under investigation it was fluctuating very close to 100. The highest exchange rate value among the examined central European economies was equal to 136.81 and it was observed in Slovakia in 2009. The figure indicates also that for the majority of analysed countries, specifically for Bulgaria, Estonia, Latvia, Lithuania and Slovakia, the period between 2004 and 2009 was the time of significant boost in real exchange rate. In Hungary, the Czech Republic and Poland an upsurge was reported for the years 2004-2008, and in the case of Romania for the years 2004-2007. As it can be seen in Fig.7, the real exchange in total increased the most in Romania (+35.88%) and Slovakia (+36.81%).What is more, the graphs show that in general, in the investigated time period an upward trend in real exchange rate was observed for all of the countries in the sample apart from Slovenia, where it slightly decreased.

Fig. 7. Real exchange rate in the time period 2004-2013, by country.



Source: own STATA calculations.

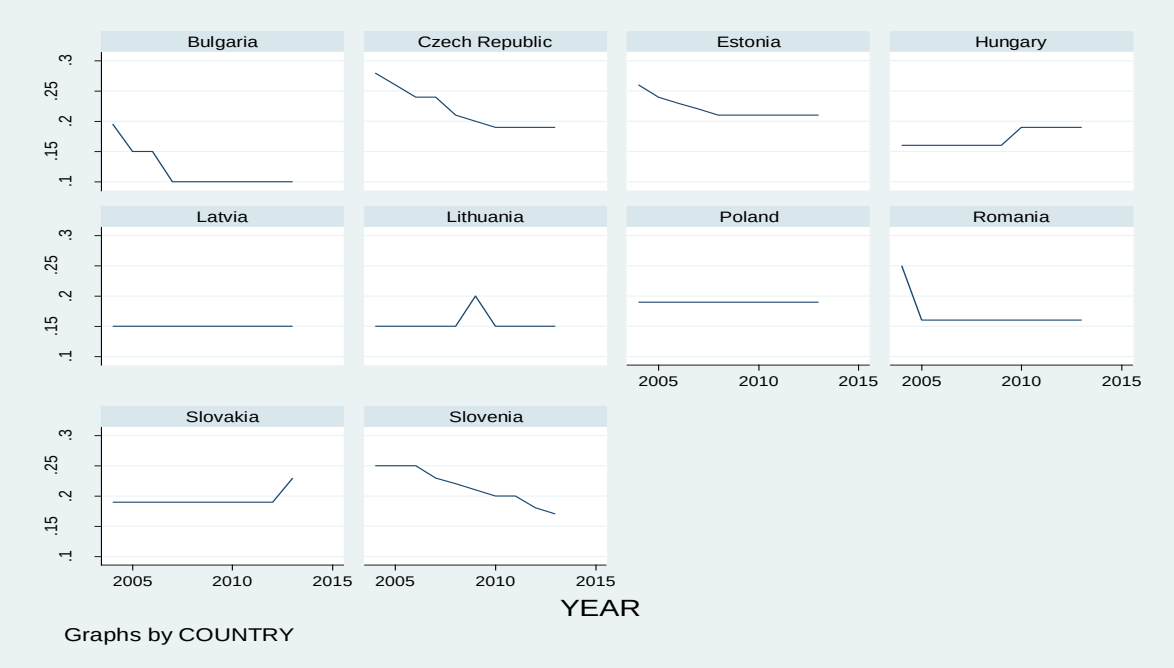
Fig. 8. Annual share of imports in GDP in the time period 2004-2013, by country.



Source: own STATA calculations.

The set of explanatory variables taken into account in this research includes also imports as a share of GDP (iports_GDP). This measure reflects the openness to trade of each of the analysed countries in the time period under investigation. The source of the data is the online database of the World Bank. Fig.8 illustrates the annual share of imports in GDP for the ten examined central European economies between 2004 and 2013. The graph indicates that the deepest year-to-year decreases in the value of this variable were reported for Lithuania, where it fell from 71.41% in 2008 to 55.74% in 2009, and for Bulgaria, where it declined from 73.79% in 2008 to 52.35% in 2009. The most stable share of imports in GDP was observed for Poland and for Romania. These were also the countries characterized with the lowest shares of imports in GDP in the sample during the whole of examined time period. Furthermore, from Fig.8 it can be seen that the economy for which the reported share of imports in GDP was the highest between 2004 and 2013 was Slovakia. In general, from the graphs presented in Fig.8 it can be concluded that until the year 2008 in central European countries a tendency toward an increase in the share of imports in GDP was observed, followed by a slight decrease in 2009 and then a modest increase between 2010 and 2012, again followed by a low scale decline in 2013.

Fig. 9. Annual corporate tax rate in the time period 2004-2013, by country.

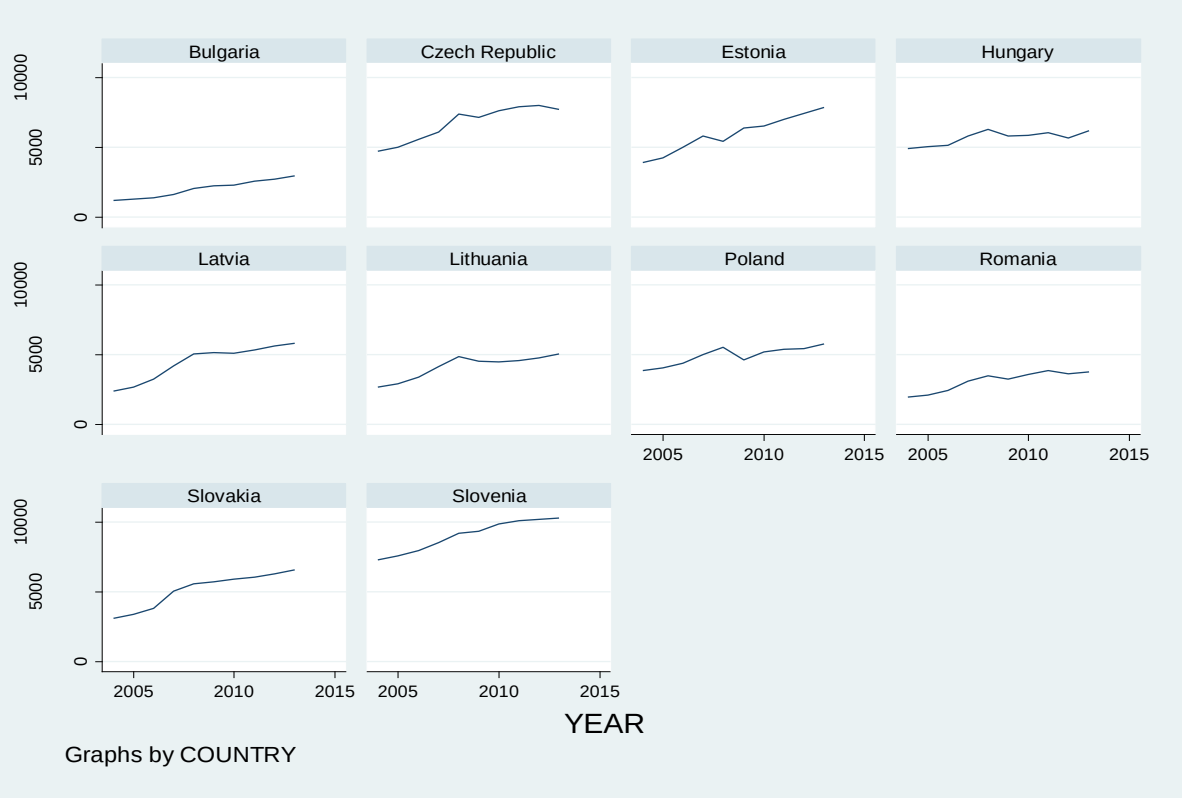


Source: own STATA calculations.

Another regressor in the estimated panel data model is the corporate tax rate (CTR). The annual data regarding the values of this explanatory variable for the investigated group of countries between 2004 and 2013 are taken from the OECD Tax Database available online. As shown in Fig.9, in the dataset the highest degree of stability in terms of the corporate tax rate was observed for Latvia and Poland. In those two countries throughout the examined time period the CTR was equal to 0.15, and 0.16 accordingly. A similar trend is visible in the case of Slovakia, however in this country a change in corporate tax rate occurred in 2013 when it was increased from 19% to 23%. From Fig.9 it can also be seen that in Romania the CTR was initially equal to 0.25, but then in 2005 it was downgraded to 0.16 and this value persisted till 2013. The graph indicates also that in four investigated countries, namely in

Bulgaria, the Czech Republic, Estonia and Slovenia, the corporate tax rate was gradually lowered between 2004 and 2013. In Hungary, on the other hand, the CTR was raised in the year 2010 from 16% to 19%. In Lithuania the corporate tax rate was increased in 2008 to 20%. In this case however, the change was only temporary and in 2009 the CTR was back on its 2007 level of 15%.

Fig. 10. Labour cost in the time period 2004-2013, by country.



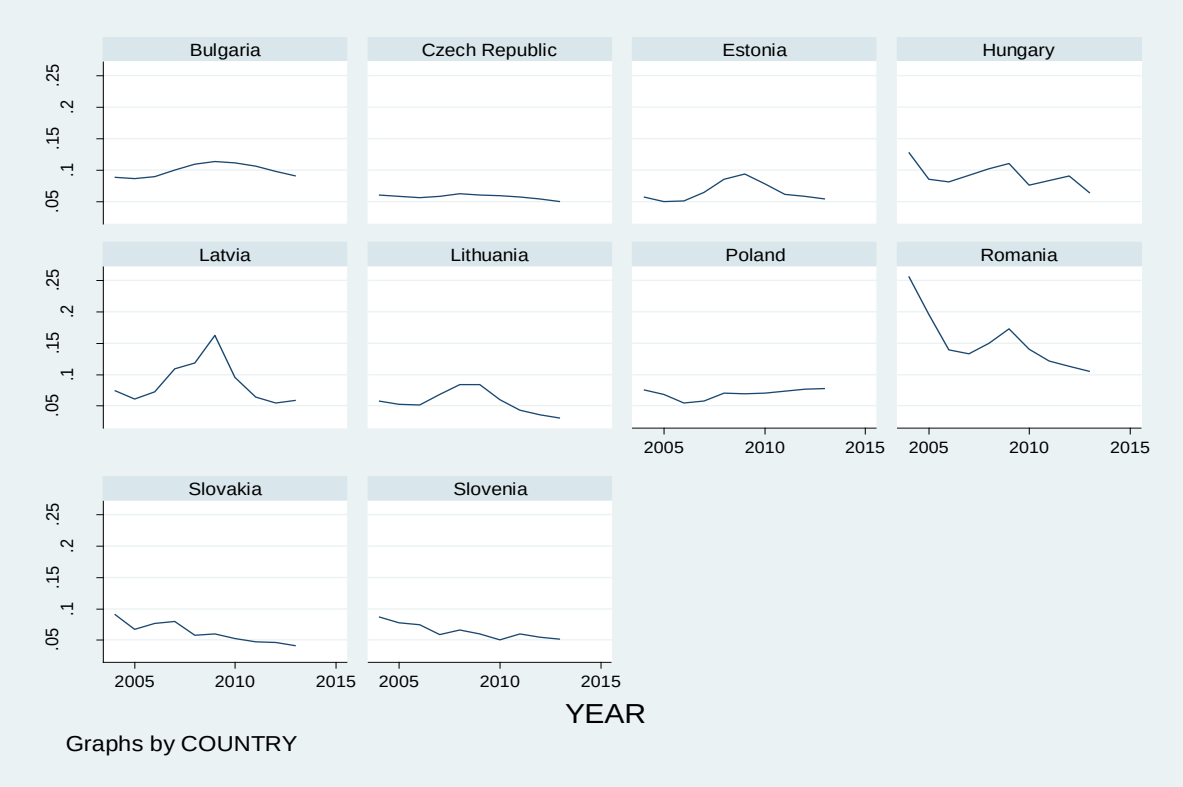
Source: own STATA calculations.

One more explanatory variable to be analysed is the cost of labour. In the dataset it is represented by the annual total earnings per worker including taxes and benefits. The data come from the EUROSTAT online database and are expressed in euros. As can be seen from Fig.10, in the examined time period only in three countries, namely in Bulgaria, Slovakia and Slovenia labour costs were rising each year. To be more specific, between 2004 and 2013, the highest increases in the values of this variable were observed for Bulgaria (+153.81%) and Slovakia (+111.9%).The most stable labour costs were reported in Hungary. In general, from Fig.10 it can be concluded that in the time period 2004-2008 an upward trend is visible in the majority of analysed economies, followed by a slight decrease in 2009 and an improvement of similar scale in the subsequent years. The graph indicates also that between 2004 and 2013 Bulgaria was the country characterized with the lowest labour costs. The highest values were on the other hand reported for Slovenia, the Czech Republic and Estonia.

Country risk (country_risk) is the next regressor used in this study. In the dataset it is expressed in the form of lending interest rate. The data on the values of this particular interest rate for the examined central European countries between 2004 and 2013 have been obtained from the World Bank online database. Visual representation of the annual levels of the country risk variable in the investigated time

period is presented in Fig.11. For Latvia, Estonia, Lithuania and Bulgaria, first a significant increase, and then a decrease of similar magnitude has been observed. The most substantial change in lending interest rate has been recorded in the case of Latvia. Regarding Slovakia, Slovenia and the Czech Republic, the figure shows a decreasing trend of low magnitude, with the smallest variation range in the last one. As follows from Fig.11, the biggest overall decrease in country risk was reported for Romania (-53%). A similar change occurred in Hungary, but to a lower extent (-50.86%). One interesting example when it come to the values of lending interest rate is Poland. According to the graph presented below, for this economy there was practically no variation in country risk variable. In 2004 it was equal to 0.0756, while in 2013 it amounted to 0.0774.

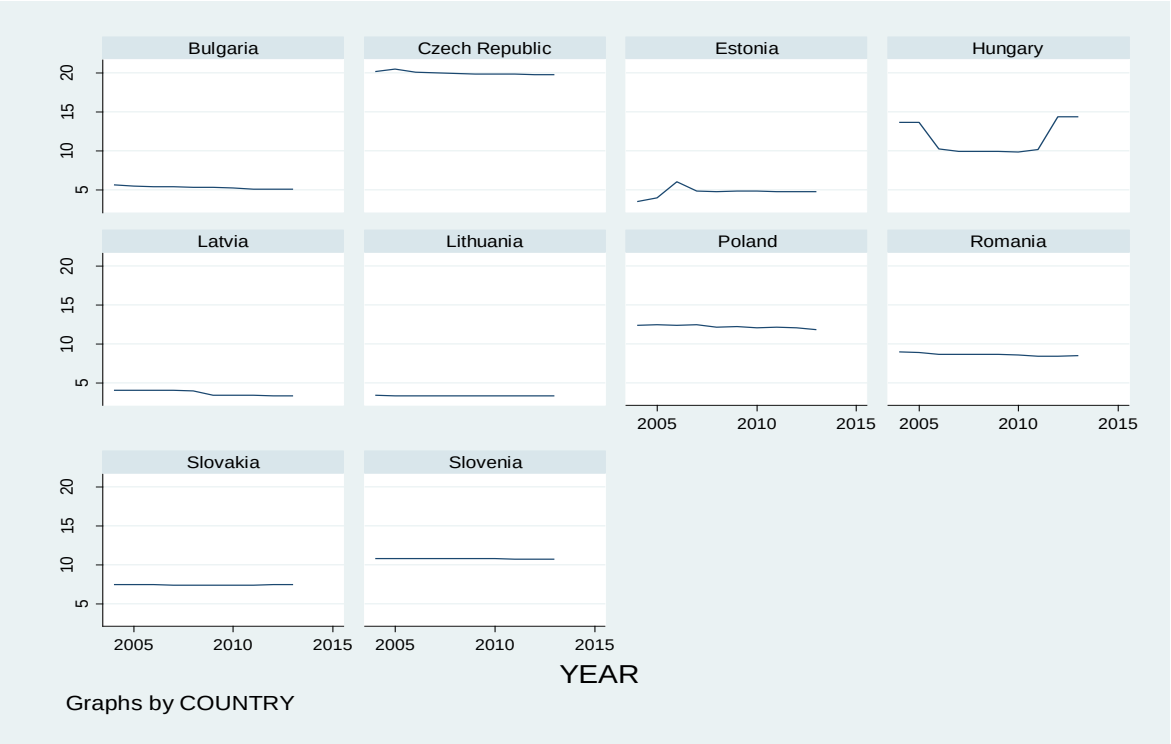
Fig. 11. Annual lending interest rate in the time period 2004-2013, by country.



Source: own STATA calculations.

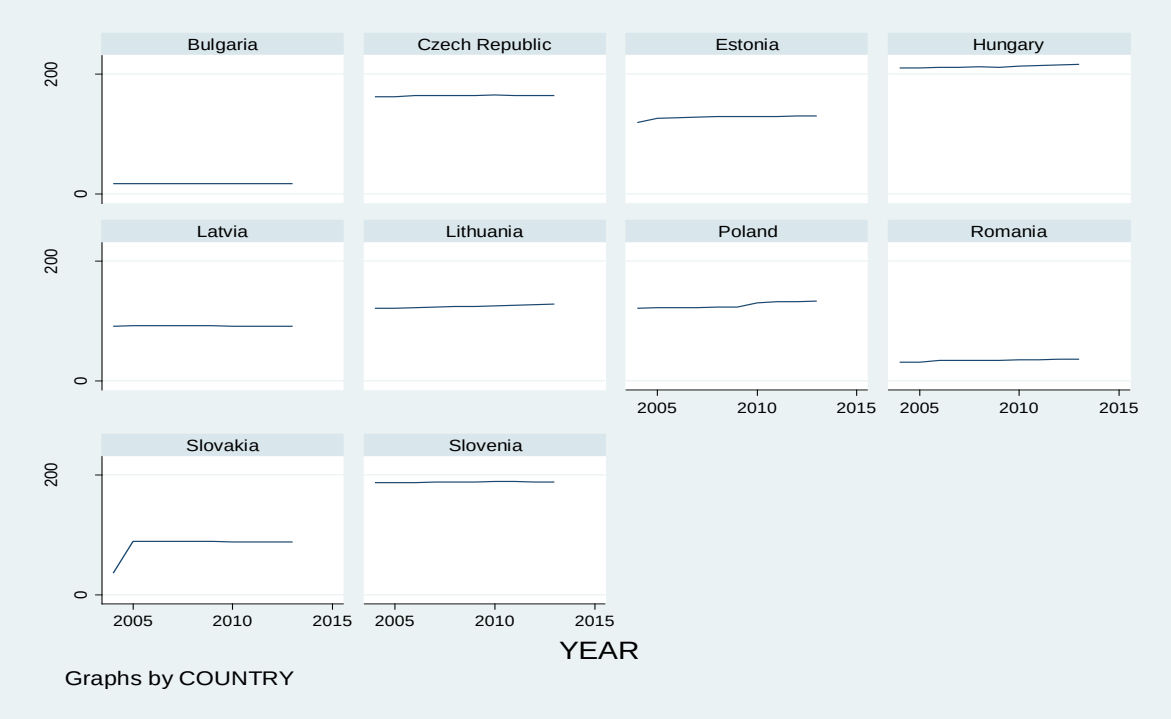
In the estimated panel data model two explanatory variables referring to the level of development of infrastructure in the analysed central European countries in the time period 2004-2013 have been included. The first one from among them is the length of railways (in km) per 100 km^2 of area (railways). The data on this variable come from the own calculations of the author of this study based on the EUROSTAT online database publication “Railway transport – Length of tracks, total in kilometres” and the data on the area of countries published in “The World Factbook” of the CIA. Visual representation of the regressor is illustrated in Fig.12. From the graphs presented there, it follows that in the time period 2004-2013 the highest length of railways per 100 km^2 of area, was noted in the Czech Republic, Hungary, Poland and Slovenia. The only countries for which in 2013 the railways index was higher than in 2004 were Estonia and Hungary. In the other examined economies this variable variable was rather stable with a slight downward trend.

Fig. 12. Length of railways (in km) per 100 km^2 of area in the time period 2004-2013, by country.



Source: own STATA calculations.

Fig. 13. Length of roads (in km) per 100 km^2 of area in the time period 2004-2013, by country.



Source: own STATA calculations.

Another regressor referring to infrastructure development in the ten countries is the length of roads in km per 100 square kilometres. In the dataset it is labelled as “roads”. The data source in the case of this variable are own calculations of the author based on the EUROSTAT online database publication

"Length of other roads by category of roads, total in kilometres" and the data on the area of countries published in "The World Factbook" of the CIA. The changes in the variable throughout the analysed time period are illustraded graphically in Fig.13. The plots presented there indicate that in the years 2008 and 2009 in most investigated countries a slowdown occurred in the development of new roads. In general, however, in the examined period a gradual increase in the lngth of roads per 100 km^2 of land was observed in the vast majority of the economies under scrutiny. The biggest improvement in the road infrastructure between 2004 and 2013 occurred in Slovakia, Romania, Estonia and Poland. The only country where the index deteriorated was Latvia. Throughout the investigated time period, the economies with the most developed road infrastructure in the described sample were Hungary, the Czech Republic and Poland.

In order to examine the relationships among the variables in the estimated model correlations have been calculated. The focus is on the impact of explanatory variables on the dependent variable explained in the regression equation. The results are demonstrated in Table 7. Following the information reported there, FDI inflows are positively influenced by market size, GDP growth, real exchange rate, labour cost index, country risk, km of railways per 100 km^2 and also by corporate tax rate, however, in this case the effect is negligible. At the same time, inward FDI is negatively related to imports as a share of GDP and km of roads per 100 km^2, but when it comes to the latter, the impact appears to be insignificant.

Table 7. Correlation matrix.

	FDI inflows	**Market size**	**GDP growth**	**Exchange rate**	**Imports share in GDP**	**CTR**	**Labour cost**	**Country risk**	**Railways**	**Roads**
FDI inflows	**1.0000**									
Market Size	**0.6247**	**1.0000**								
GDP growth	**0.2286**	-0.0050	**1.0000**							
Exchange rate	**0.1485**	0.2597	-0.2820	**1.0000**						
Imports share in GDP	**-0.3632**	-0.5098	0.1149	-0.0996	**1.0000**					
CTR	**0.0345**	0.1107	0.0830	-0.2085	0.0723	**1.0000**				
Labour cost	**-0.2147**	0.0575	-0.2960	-0.0326	0.2957	0.4893	**1.0000**			
Country risk	**0.1270**	-0.0054	-0.1568	0.1406	-0.4609	-0.2505	-0.4626	**1.0000**		
Railways	**0.4067**	0.5358	-0.0505	0.0912	-0.1606	0.4552	0.4150	-0.1101	**1.0000**	
Roads	**-0.0450**	0.1127	-0.1384	-0.4153	0.3043	0.4898	0.7431	-0.4498	0.4877	**1.0000**

Source: own STATA calculations.

The detailed information on the main descriptive statistics of all the above described independent variables used for the purpose of this research is summarized in Table 8. It includes the mean, the standard deviation, the minimum and the maximum values and the number of observations.

Table 8. The main descriptive statistics of explanatory variables.

Variable	Mean	Standard deviation	Minimum	Maximum	Observations
market_size overall	1.14e+11	1.23e+11	1.20e+10	5.29e+11	N = 100
market_size between		1.24e+11	1.96e+10	4.28e+11	n = 10
market_size within		3.48e+10	-6.08e+10	2.16e+11	T = 10
GDP_growth overall	0.0296489	0.0528106	-0.1795499	0.1223323	N = 100
GDP_growth between		0.0105479	0.0089534	0.0415179	n = 10
GDP_growth within		0.0518441	-0.1832585	0.1186238	T = 10
exchange_rate overall	111.5189	10.76323	96.15034	136.8119	N = 100
exchange_rate between		7.668571	99.43303	122.2881	n = 10
exchange_rate within		7.898497	89.23085	126.2818	T = 10
imports_GDP overall	0.605983	0.1836517	0.0054202	0.8841594	N = 100
imports_GDP between		0.1394835	0.413459	0.8108153	n = 10
imports_GDP within		0.1266531	0.0782876	0.8568187	T = 10
CTR overall	0.18055	0.0383228	0.1	0.28	N = 100
CTR between		0.033601	0.1195	0.221	n = 10
CTR within		0.0210297	0.13455	0.26155	T = 10
labour_cost overall	5103.897	2082.6	1157.08	10259.18	N = 100
labour_cost between		1939.245	2014.463	9005.513	n = 10
labour_cost within		958.3478	3043.032	7028.14	T = 10
country_risk overall	0.0804672	0.034909	0.03105	0.256125	N = 100
country_risk between		0.029468	0.0568233	0.1528583	n = 10
country_risk within		0.0207176	0.0328339	0.1837339	T = 10
railways overall	8.770923	4.926411	7.027071	20.48512	N = 100
railways between		5.11723	3.346524	19.99483	n = 10
railways within		0.6812017	7.027071	11.54227	T = 10
roads overall	116.7651	60.01188	17.08619	216.078	N = 100
roads between		62.68114	17.14716	212.5317	n = 10
roads within		5.447427	69.4842	123.5377	T = 10

Source: own STATA calculations.

CHAPTER IV
Model specification and estimation results

The purpose of this paper is to investigate the potential determinants of foreign direct investment inflows to ten countries located in the central Europe, namely to Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. To examine this issue a panel data approach has been adopted. The main reason why this method has been chosen is that it accounts for individual heterogeneity. This means that with panel data it is possible to include into the estimated regression equation variables at different levels of analysis suitable for multilevel or hierarchical modelling.

In order to verify which type of panel data model, specifically, random effects model or fixed effects model, should be employed in the described study, the Hausman test has been carried out. The main aim of this type of assessment is to check whether the individual effects (u_i) are correlated with the regressors. The null hypothesis in the Hausman test states that effects are not correlated with the regressors. If it is not rejected it implies that the preferred solution to be applied in the research is the random effects (RE) model as in such a case it produces consistent and efficient estimates, while the fixed effects model also gives consistent, but not efficient outcomes. The alternative hypothesis is that effects (u_i) are correlated with the regressors, and hence, fixed effects model is preferred because it generates consistent estimates. The results of the Hausman test are summarized in Table 9. As follows from the information presented in this table, the null hypothesis has been rejected on a 5% significance level, and thus in the discussed study fixed effects regression ought to be adopted.

Table 9. Hausman test.

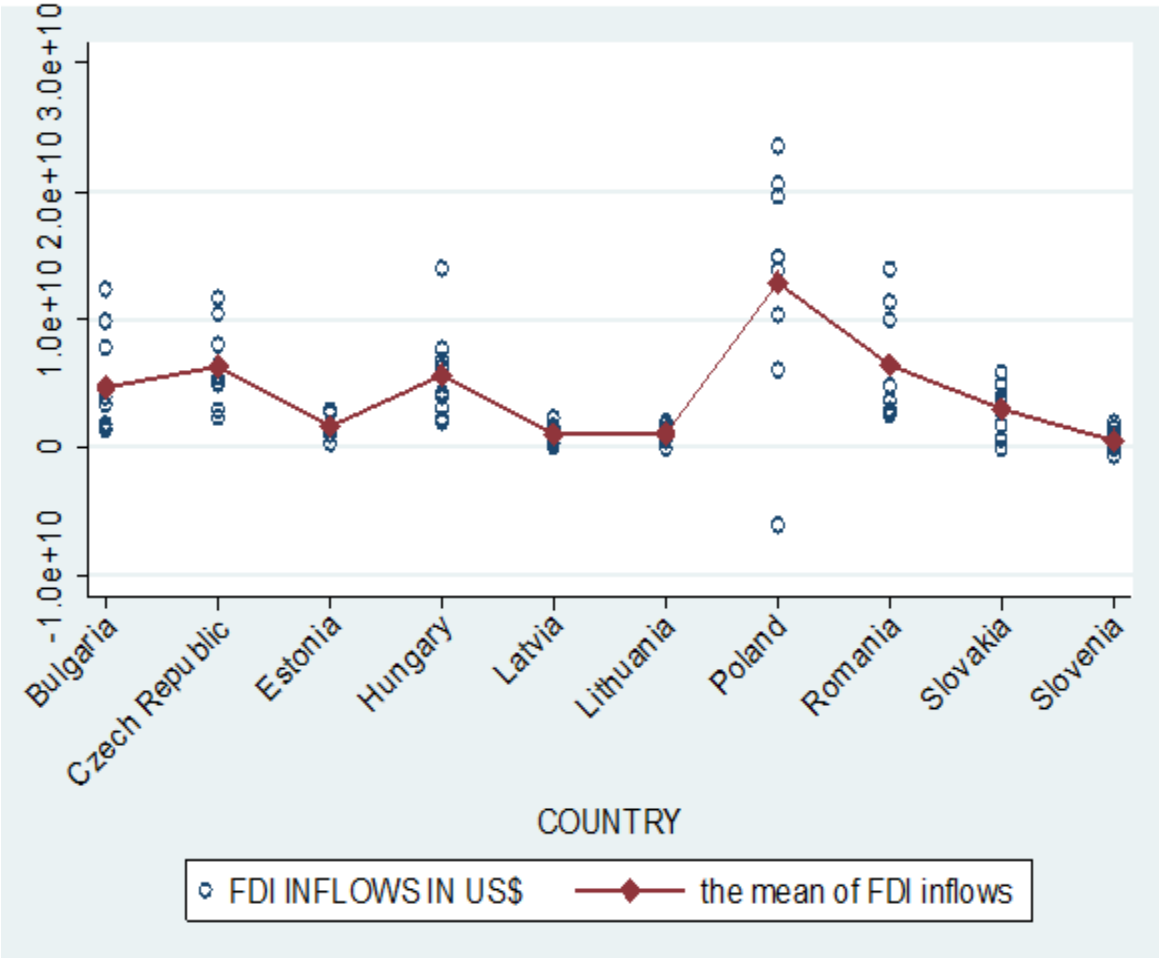
H_0:	individual effects (u_i) are not correlated with the regressors
H_1:	individual effects (u_i) are correlated with the regressors
$\chi^2(7)$	= 14.48
p-value	= 0.0433
α	= 0.05 (5% significance level)
Conclusion:	**p-value < α** We reject the null hypothesis.

Source: own STATA calculations.

In general, the proposed procedure should be applied in a research whenever the main concern of estimation is to analyse the impact of explanatory variables that vary over time on the dependent variable. The main reason for this is the fact that fixed effects regression explores the relationship between predictor and outcome variables within an entity, for example a country, person, or company. It is worth noting that each of those entities has its own individual characteristics that can influence the explanatory variables. When using FE technique we control for the factors within the individual that result from the existing correlation between entity's error term and predictor variables. Furthermore, fixed

effects method removes the effect of time-invariant characteristics, and thus allows for the assessment of the net effect of the predictors on the outcome variable.

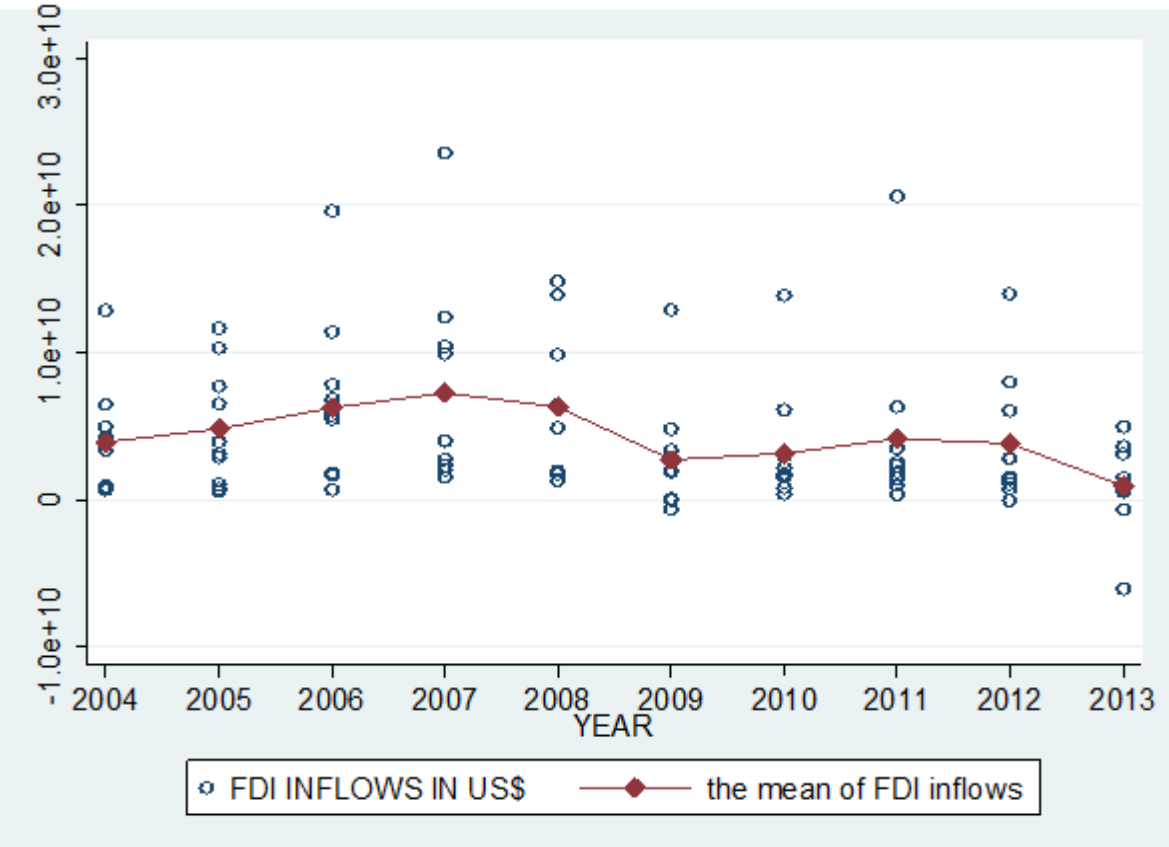
Fig. 14. Fixed effects: heterogeneity across countries.



Source: own STATA calculations.

The rationale behind the use of the fixed effects regression model is presented graphically in Fig.14 and Fig.15. The first one from among the two graphs depicts fixed effects in terms of the heterogeneity that is observed in the analysed time period across countries under investigation. As follows from this figure, foreign direct investment inflows to each of the examined economies vary over time. However, it should be noted that in the case of Estonia, Latvia, Lithuania and Slovenia the magnitude of recorded changes is much lower than for other investigated countries. Fig.15, on the other hand, illustrates fixed effects in the estimated model when it comes to the heterogeneity that occurs across years. From this figure it can be seen that each year the volume of inward foreign direct investment differed among the ten examined central European countries. The lowest scale of divergence of FDI inflows from its mean value was reported for the years 2013 and 2005. The highest fluctuations were on the contrary observed in the analysed sample for the years 2007, 2011 and 2006.

Fig. 15. Fixed effects: heterogeneity across years.



Source: own STATA calculations.

In order to investigate the set of factors that according to the literature are expected to influence the volume of inward foreign direct investment located by transnational corporations in the examined group of central European countries in the time period 2004-2013, two different types of panel data models have been estimated and analysed, namely the fixed effects (FE) model and the time-fixed effects (TFE) model. The equations that express the discussed dependence between inward FDI and its probable determinants are presented below.

The general formula that describes the fixed effects model employed for the purpose of this study is given by a following equation:

$$Y_{it} = \beta_0 + \beta_1 X_{1,it} + \ldots + \beta_j X_{j,it} + \alpha_i + u_{it}$$

where:

- α_i = the unknown intercept for each entity (n entity-specific intercepts);
- Y_{it} = the dependent variable, and index i represents entity, while index t represents time;
- $X_{j,it}$ = j^{th} explanatory variable, j=1,…,k.;
- β_0 = the coefficient for the constant;
- β_j = the coefficient for the j^{th} explanatory variable, j=1,…,k.;
- u_{it} = the error term.

In this connection, the relation between the foreign direct investment inflows to selected central European countries in the time period 2004-2013 and its potential economic and non-economic determinants, which is investigated in the discussed research, is defined as:

$$FDI\_inflows_{it} = \beta_0 + \beta_1 market\_size_{it} + \beta_2 market\_growth_{it} + \beta_3 exchange\_rate_{it} + \beta_4 imports\_GDP_{it} + \beta_5 CTR_{it} + \beta_6 labour\_cost_{it} + \beta_7 country\_risk_{it} + \beta_8 railways_{it} + \beta_9 roads_{it} + \alpha_i + u_{it}$$

where:

- β_0 = the coefficient for the constant;
- β_j = the coefficient for the j^{th} explanatory variable, j = 1,2,…,9.;
- **it** = i represents country, t represents time:
    - **i** = country number = 1,2,…,10.
        - 1 = Bulgaria;
        - 2 = Czech Republic;
        - 3 = Estonia;
        - 4 = Hungary;
        - 5 = Latvia;
        - 6 = Lithuania;
        - 7 = Poland;
        - 8 = Romania;
        - 9 = Slovakia;
        - 10 = Slovenia;
    - **t** = 2004, 2005, …, 2013.

As it has already been mentioned, the second estimation method applied in this study to examine the potential determinants of foreign direct investment inflows to the ten analysed economies between 2004 and 2013 is the time-fixed effects model. The equation that represents the general formula for the TFE regression estimated in the described research has got a following structure:

$$Y_{it} = \beta_0 + \beta_1 X_{1,it} + \ldots + \beta_k X_{k,it} + \delta_2 T_2 + \ldots + \delta_t T_t + u_{it}$$

where:

- Y_{it} = the dependent variable, in which index i represents entity, while index t represents time;
- $X_{j,it}$ = j^{th} explanatory variable, j = 1,…,k.;
- β_0 = the coefficient for the constant;
- β_j = the coefficient for the j^{th} explanatory variable, j = 1,…,k.;
- u_{it} = the error term;
- T_t = time dummy variable;
- δ_t = the coefficient for the dummy variable time regressors.

Consequently, the equation that describes the estimated time-fixed effects model investigating the foreign direct investment inflows to central European countries in the time period 2004-2013 is as follows:

$$FDI\_inflows_{it} = \beta_0 + \beta_1 market\_size_{it} + \beta_2 market\_growth_{it} + \beta_3 exchange\_rate_{it} + \beta_4 imports\_GDP_{it} + \beta_5 CTR_{it} + \beta_6 labour\_cost_{it} + \beta_7 country\_risk_{it} + \beta_8 railways_{it} + \beta_9 roads_{it} + \delta_{2005} T_{2005} + \delta_{2006} T_{2006} + \delta_{2007} T_{2007} + \delta_{2008} T_{2008} + \delta_{2009} T_{2009} + \delta_{2010} T_{2010} + \delta_{2011} T_{2011} + \delta_{2012} T_{2012} + \delta_{2013} T_{2013} + u_{it}$$

where:

- β_0 = the coefficient for the constant;
- β_j = the coefficient for the j^{th} explanatory variable, j = 1,2,…,9.;
- **it:**
  - **i** = country number = 1,2,…,10.;
  - **t** = year = 2004, 2005,…, 2013.

After the structure of both estimated regression equations was specified, several diagnostic tests have been carried out so as to verify whether the assumptions made were correct. Firstly, the proposed models were assessed for groupwise heteroscedasticity with the use of the modified Wald test. The null hypothesis there states that homoscedasticity is present in the examined model. The results of the test are displayed in Table 10. As follows from the information presented in this table, the null hypothesis is rejected on the 5% significance level for the fixed effects model, as well as for the time-fixed effects model. Thus, it can be concluded that in both regressions the problem of heteroscedasticity occurs. To overcome this difficulty, it is necessary to adopt heteroscedasticity-robust standard errors, which for xtreg are known as Huber/White or sandwich estimators.

Table 10. Modified Wald test for groupwise heteroscedasticity in the fixed effects (FE) model and the time-fixed effects (TFE) model.

	FE model	**TFE model**
H_0:	homoscedasticity	homoscedasticity
χ^2 (10)	= 1497.09	= 172.72
p-value	= 0.0000	= 0.0000
α	= 0.05 (5% significance level)	= 0.05 (5% significance level)
Conclusion:	p-value < α We reject the null hypothesis. There is heteroscedasticity in the FE model.	p-value < α We reject the null hypothesis. There is heteroscedasticity in the TFE model.

Source: own STATA calculations.

Subsequently, the Wooldridge test for autocorrelation in panel data has been performed on the dataset used for the purpose of the described study. From the outcomes outlined in Table 11, it can be seen that on the 5% significance level there is no reason to reject the null hypothesis of no serial correlation. Consequently, it may be deduced that there is no problem of autocorrelation existent in the estimated models.

Table 11. Wooldridge test for autocorrelation in panel data.

H_0:	no serial correlation
F (1 , 9)	= 2.853
p-value	= 0.1255
α	= 0.05 (5% significance level)
Conclusion:	p-value > α No reason to reject the null hypothesis. There is no serial correlation in the model.

Source: own STATA calculations.

Afterwards, the Breusch-Pagan LM test of independence have been carried out, whereby it was examined whether residuals across entities in the proposed regressions are correlated or not. The presence of such a relationship implies the existence of cross-sectional dependence in the analysed models. This phenomenon, which is also known as contemporaneous correlation, can lead to bias in tests results because of the fact that it causes the standard errors of the coefficients to be smaller than they actually are. Moreover, it increases the R-squared. Nevertheless, it should be noted that still it is not much of a problem in micro panels that consist of data covering time period shorter than 20 years. As shown in Table 12, in the case of the fixed effects model the null hypothesis asserting that errors across entities are not correlated is rejected on 5% significance level. This result allows to make an inference that cross-sectional dependence is observed in the first one from among the two estimated regression equations.

Table 12. Breusch-Pagan LM test of independence for the FE model.

H_0:	Errors across entities are not correlated
X^2 (45)	= 61.766
p-value	= 0.0490
α	= 0.05 (5% significance level)
Conclusion:	p-value < α We reject the null hypothesis. There is cross-sectional dependence in the model.

Source: own STATA calculations.

Table 13 presents the correlation matrix of residuals for the fixed effects model with robust standard errors, which has been used for the purpose of the described Breusch-Pagan LM test of independence.

Table 13. Correlation matrix of residuals for the FE model with robust standard errors.

	_e1	**_e2**	**_e3**	**_e4**	**_e5**	**_e6**	**_e7**	**_e8**	**_e9**	**_e10**
_e1	**1.0000**									
_e2	0.4023	**1.0000**								
_e3	0.0469	0.3381	**1.0000**							
_e4	0.0118	0.0648	-0.2324	**1.0000**						
_e5	-0.5430	-0.1562	0.3981	0.0673	**1.0000**					
_e6	0.4597	0.1270	0.6321	0.0745	0.3951	**1.0000**				
_e7	0.4142	-0.1878	-0.1443	0.3425	-0.2993	0.1500	**1.0000**			
_e8	0.4724	-0.0812	0.1386	0.1806	0.0724	0.7296	0.0706	**1.0000**		
_e9	0.6477	0.2782	-0.3469	0.4923	-0.6577	0.0421	0.4125	0.2993	**1.0000**	
_e10	-0.6722	-0.3542	0.2078	0.2426	0.8528	0.1720	0.0237	-0.0086	-0.5450	**1.0000**

Source: own STATA calculations.

The outcome of the Breusch-Pagan LM test of independence carried out for the time-fixed effects model is outlined in Table 14. As shown in this table, the p-value is lower than the assumed 5% significance level. Thus, the null hypothesis stating that errors across entities are not correlated in the analysed regression is rejected. Consequently, it can be concluded that cross-sectional dependence is present in the estimated TFE model.

Table 14. Breusch-Pagan LM test of independence for the TFE model.

H_0:	Errors across entities are not correlated
X^2 (45)	= 78.393
p-value	= 0.0015
α	= 0.05 (5% significance level)
Conclusion:	p-value < α We reject the null hypothesis. There is cross-sectional dependence in the model.

Source: own STATA calculations.

The correlation matrix for the time-fixed effects model, which has been calculated in order to perform the discussed independence test is given in Table 15.

Table 15. Correlation matrix of residuals for the TFE model with robust standard errors.

	_e1	_e2	_e3	_e4	_e5	_e6	_e7	_e8	_e9	_e10
_e1	**1.0000**									
_e2	-0.0119	**1.0000**								
_e3	-0.2329	0.4361	**1.0000**							
_e4	-0.4920	-0.2059	-0.5008	**1.0000**						
_e5	-0.3927	0.2182	0.6013	-0.2646	**1.0000**					
_e6	-0.1339	0.3836	0.5903	-0.5250	0.6741	**1.0000**				
_e7	0.0915	-0.6435	-0.5719	0.2338	-0.5707	-0.7708	**1.0000**			
_e8	0.5562	-0.1454	-0.0989	-0.1972	-0.1824	0.1250	-0.3476	**1.0000**		
_e9	0.0038	0.1645	-0.3929	0.3197	-0.5101	-0.1546	-0.0592	0.1001	**1.0000**	
_e10	-0.6643	0.1918	0.4808	-0.1106	0.7707	0.7791	-0.5433	-0.2379	-0.2325	**1.0000**

Source: own STATA calculations.

One possible solution to the observed problem is the use of Driscoll and Kraay standard errors in order to estimate the coefficients in both the fixed effects model and the time-fixed effects model. The main reason for this is the fact that the outcomes produced with the use of the above method are robust to disturbances such as cross-sectional dependence, but not only. Furthermore, the results it gives are resistant to heteroscedasticity, which was another difficulty indicated by the carried out diagnostic tests. Therefore, the suggested approach is an effective technique to overcome all the detected problems.

In this study, the estimation process started with the calculation of coefficients of the fixed effects model of foreign direct investment inflows to the ten selected European Union member states located in the central Europe in the time period between 2004 and 2013. Following the procedure proposed in the previous paragraph, so as to avoid the difficulties indicated by diagnostic tests, the FE regression was carried out with the use of the Driscoll-Kraay standard errors.

The dataset used in order to estimate the proposed fixed effects model consists of 100 observations divided into 10 groups. Each one from among the distinguished groups represents one of the investigated countries. The group variable in the described regression is the country number (country_no), which ranges from 1 to 10, where 1=Bulgaria, 2=the Czech Republic, 3=Estonia, 4=Hungary, 5=Latvia, 6=Lithuania, 7=Poland, 8=Romania, 9=Slovakia and 10=Slovenia. The within coefficient of determination (R^2) obtained in the estimation process equals to 0.2417. This outcome means that 24.17% of foreign direct investment inflows changeability for analysed countries is explained by changeability of explanatory variables.

In order to check for the joint significance of the regressors included in the estimated fixed effects model the F-test was performed. As follows from Table 16, the null hypothesis asserting that none of the explanatory variables has predictive power is rejected on the assumed 5% significance level. Thus, it can be concluded that the variables incorporated in the FE model are jointly significant.

Table 16. F-test of joint significance of variables in the fixed effects model.

H_0:	$\beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = 0$
F (9, 9)	= 307.48
p-value	= 0.0000
α	= 0.05 (5% significance level)
Conclusion:	p-value < α We reject the null hypothesis. Variables in the model are jointly significant.

Source: own STATA calculations.

The significance of individual variables included in the fixed effects model was tested with the use of the t-test. This form of assessment verifies the null hypothesis that the coefficient for each of the regressors in the estimated equation is equal to zero, which can be written as $\beta_j = 0$ for j=1,2,..,9. So as to be able to make an inference that a particular explanatory variable has a significant influence on the dependent variable, in this case, FDI inflows, the t-statistic in the absolute value has to be higher than 1.96 for 95% confidence interval. Furthermore, it is worth noting that the higher the t-value, the higher is the relevance of a specific regressor.

The results obtained in the fixed effects model of the determinants of foreign direct investment inflows to central European countries in the time period 2004-2013 are summarized in Table 17. These outcomes are broadly consistent with other studies on the factors affecting inward FDI to transition economies located in the centre of Europe.

Table 17. Fixed-effects regression with Driscoll-Kraay standard errors.

Variable	Coefficient	t-statistic
market_size	-0.0136206	-0.98
market_growth	**1.38e+10***	**3.01**
exchange_rate	**2.16e+08***	**3.35**
imports_GDP	**1.36e+10***	**5.49**
CTR	1.78e+09	0.32
labour_cost	**-1477035***	**-4.40**
country_risk	6.58e+09	0.99
railways	**1.01e+09***	**3.65**
roads	**-9.36e+07***	**-2.69**
_cons	-1.85e+10*	-7.40
Legend: * means that the variable has a significant influence on the dependent variable		

Source: own STATA calculations.

As can be seen from Table 17, market size, corporate tax rate and country risk variables proved not to be significant as determinants of foreign direct investment inflows to the analysed countries in the investigated time period. When it comes to market size, the finding that in the examined sample this specific regressor is of no significance to inward FDI was quite surprising. This result is in contrast to some reports in the literature stating that gravity factors have been fundamental for the volume of capital located in the form of foreign direct investment, particularly in the Czech Republic, Hungary and Poland, the Central European economies that actually received the highest amount of foreign capital. Regarding the insignificance of country risk variable, following the claims presented in other studies on the issue under scrutiny in this paper, it can be said that inward foreign direct investment to transition economies located in Central Europe is not substantially affected by market valuations of country-specific risk. One plausible explanation may be the fact that all of the investigated countries either since 2004 or 2007, in the case of Bulgaria and Romania, have been the member states of the European Union and this membership works as a form of stabilizing factor. Concerning corporate tax rate, actually it is difficult to unambiguously answer the question on how FDI reacts to taxation because of the existence of an evident trade-off between ensuring a competitive tax environment for foreign direct investment and collection of an appropriate share of domestic tax from multinational firms. Nevertheless, the main reason why CTR is not significant in the estimated fixed effects model appears to be such that simply it is not the most important factor influencing location decisions of transnational corporations. There are more relevant determinants of inward FDI like for example access to markets and profit opportunities, macroeconomic stability, predictable and non-discriminatory legal framework, skilled and responsive labour force and well-developed infrastructure.

Furthermore, as follows from Table 17, the results obtained in the FE regression show that foreign direct investment inflows are positively influenced by market growth, exchange rate, imports as a share of GDP and km of railways per 100 square km. These results are consistent with previous expectations. From Table 17 it can be seen that the coefficient for market growth equals to 1.38e+10, which means an increase in the market growth rate by 0.01 leads to a rise in FDI inflows by 138 million of US dollars. This outcome is in good agreement with theoretical predictions, as in general high market growth rate represents high market potential, and thus it attracts inward foreign direct investment. Moreover, Table 17 shows that the coefficient for the exchange rate is positive and amounts to 2.16e+08, meaning that a one unit increase in the exchange rate level results in a growth in inward FDI by 216 million of US dollars. This result is compatible with other studies on the issue according to which in developed economies exchange rate is positively correlated with capital inflows. As follows from Table 17, the coefficient for the share of imports in GDP is positive as well and equals to 1.36e+10. The interpretation in this case is that an increase in the imports share in gross domestic product by 0.01 leads to a rise in foreign direct investment inflows by 136 million of US dollars. The data obtained in the fixed effects model are broadly consistent with what was expected. Indeed, greater openness to trade, here measured as the share of imports in each country's GDP, implies higher volume of capital being located in a particular economy in the form of FDI. This stems from the fact that foreign direct investment and trade are complementary phenomena. What is more, in Table 17 it can be found that another explanatory variable with a significant and positive coefficient, equal to 1.01e+09, is the length of

railways (in km) per 100 km^2 of area. The above outcome means that a one unit increase in the value of the described index results in a growth in inward FDI by 1010 million of US dollars. This finding is in good agreement with other studies which have shown that better infrastructure implies a higher volume of investment, especially in the tertiary sector. Furthermore, also in line with previous predictions, the fixed effects model suggests that higher labour costs negatively affect FDI inflows. Table 17 indicates that the coefficient for this particular explanatory variable amounts to -1477035, meaning that a one unit increase in the costs of labour leads to a decrease in the value of received inward foreign direct investment by approximately 1.48 million of US dollars. In other words, lower labour costs in the host country attract foreign capital, and thus lead to a greater volume of FDI inflows.

As can be seen from Table 17, contrary to the expectations the coefficient for the length of roads (in km) per 100 square km of area turned out to be negative. It equals to -9.36e+07, which means that a one unit increase in the value of the index results in a decline in inward foreign direct investment by 93.6 million of US dollars. Although this outcome is quite surprising, it may suggest that the development of road infrastructure is not the most relevant determinant of the choice of location for FDI in the case of central European countries in the time period between 2004 and 2013 and there are factors of higher importance from the perspective of potential foreign investors.

The second model employed is the time-fixed effects model. The dataset used in order to estimate the proposed TFE regression equation is exactly the same as the one employed in the standard fixed effects model. Hence, it also consists of 100 observations divided into 10 groups, each of them representing one of the analysed countries. In the case of the time-fixed effects model the within R^2 equals to 0.4204, meaning that 42.04% of the changeability of FDI for analysed countries is explained by the changeability of explanatory variables. The TFE estimation results are presented in Table 20.

To verify whether the application of the time-fixed effects regression was justified, an F-test for time-fixed effects was performed. As can be seen from Table 18, the null hypothesis stating that the coefficients for all the years are jointly equal to zero is rejected on the assumed 5% significance level. This result indicates that time-fixed effects are present in the data and, consequently the TFE model may be estimated for the purpose of the described research problem.

Table 18. F-test for time-fixed effects for the TFE model with Driscoll-Kraay standard errors.

H_0:	$\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = \gamma_7 = \gamma_8 = \gamma_9 = 0$
F (9, 9)	= 190000
p-value	= 0.0000
α	= 0.05 (5% significance level)
Conclusion:	p-value < α ➡ We reject the null hypothesis. There are time-fixed effects in the model.

Source: own STATA calculations.

Similarly to the fixed effects model, also in the case of the time-fixed effects regression, joint significance of explanatory variables incorporated in the proposed equation was tested with the use of the F-test. The outcome of the analysis is shown in Table 19. From the information presented in this table it follows that, assuming a 5% significance level, the null hypothesis asserting that none of the regressors included in the model has got predictive power, is rejected. As a result, it can be concluded that variables in the estimated TFE model with Driscoll-Kraay standard errors are jointly significant.

Table 19. F-test of joint significance in the TFE model with Driscoll-Kraay standard errors.

H_0:	$\beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = 0$
F (18, 9)	=22891.65
p-value	= 0.0000
α	= 0.05 (5% significance level)
Conclusion:	p-value < α ➡ We reject the null hypothesis. Variables in the model are jointly significant.

Source: own STATA calculations.

Table 20 shows that in the time-fixed effects model three regressors are insignificant as the determinants of foreign direct investment inflows to central European countries between 2004 and 2013, namely: market size, market growth and labour cost. Regarding the market size variable, the explanation here is the same as the one suggested for the outcome of the standard fixed effects model. The reason why labour cost turned out not to be of any significance as a potential factor exerting influence on inward FDI can be such that quality of labour, in particular, the availability of highly qualified and well educated labour force in the investigated countries, is what matters more to the capital location decisions of transnational corporations. The rationale behind this claim is straightforward. Simply speaking, it pays off to pay the better qualified workers more in order to increase their efficiency and motivation. Moreover, it should also be noted that central Europe is not the place where multinational firms look for cheap labour for production purposes, as this is type of activities are mainly carried out in poor regions of Asia. Instead of it, in the countries analysed in this study transnational corporations typically locate their information centres, accounting centres, IT centres and centres for many other business services.

As can be seen in Table 20, similarly to the previous model and in line with previous expectations, in the time-fixed effects regression three explanatory variables, particularly the exchange rate, the share of imports in GDP and the length of railways (in km) per 100 km^2 of area, positively affect the volume of received foreign direct investment. To be more specific, the coefficient for the exchange rate equals to 8.94e+07. This means that a one unit increase in the exchange rate leads to a growth in FDI inflows by 89,4 million of US dollars. At the same time, the coefficient for imports as a share of GDP amounts to 1.58e+10. The interpretation in this case is as follows: an increase in the share of imports in gross domestic product by 0.01 causes an upsurge in inward foreign direct investment by 158 million of US dollars. Table 20 also shows that the coefficient for the length of railways per 100 km^2 is positive and equals to 1.43e+09, meaning that a one unit rise in the described index results in a boost in foreign

direct investment inflows by 1430 million of US dollars. The logic behind this relationship is identical as it was aforementioned in the case of the fixed effects model. What is more, from Table 20 it can be seen that the coefficient on to the length of roads per 100 km^2 of area is negative and amounts to -1.24e+08. This outcome means that a one unit increase in the discussed index leads to a decline in the volume of inward FDI by 124 million of US dollars. Explanation here is analogical to the one suggested with regard to the FE regression.

Table 20. Time-fixed effects (TFE) regression with Driscoll-Kraay standard errors.

Variable	Coefficient	t-statistic
market_size	-0.177076	-1.25
market_growth	5.44e+08	0.10
exchange_rate	**8.94e+07***	**3.19**
imports_GDP	**1.58e+10***	**7.47**
CTR	**1.48e+10***	**3.22**
labour_cost	-350473	-1.39
country_risk	**-2.41e+10***	**-2.54**
Railways	**1.43e+09***	**5.06**
Roads	**-1.24e+08***	**-2.97**
_Iyear2005	**1.02e+09***	**5.47**
_Iyear2006	**2.12e+09***	**6.95**
_Iyear2007	**3.75e+09***	**8.23**
_Iyear2008	**3.27e+09***	**4.46**
_Iyear2009	1.46e+09	1.56
_Iyear2010	6.18e+08	1.01
_Iyear2011	6.71e+08	0.95
_Iyear2012	-2.45e+08	-0.30
_Iyear2013	**-3.00e+09***	**-3.64**
_cons	**-1.16e+10***	**-3.44**
Legend: * means that the variable has a significant influence on the dependent variable		

Source: own STATA calculations.

Although several similarities have been observed, in some points the results of the estimated time-fixed effects regression differ from the results of the standard fixed effects model. The first discrepancy between the two methods concerns the influence of corporate tax rate on foreign direct investment inflows. As shown in Table 20, contrary to the previous expectations, in the TFE model the coefficient for this explanatory variable is positive and equals 1.48e+10, meaning that an increase in the CTR by 0.01 results in a growth in foreign direct investment inflows by 148 million of US dollars. Notwithstanding, it should be noted that the sensitivity of FDI to tax depends on the mobility of business activities underlying the tax base. To be more precise, in countries characterized by a large market size,

where foreign firms benefit from reduced costs of trade, a certain degree of inertia is predicted in the location choice of firms, which allows for profits being taxed up to some point without discouraging investment. This view is consistent with the observation that a number of OECD economies with large domestic output markets and strong FDI inflows have relatively high corporate tax rates. Another dissimilarity as compared to the FE model is that in the time-fixed effects regression country risk associated with legal, political and economic environment is a deterrent of foreign direct investment inflows to central European countries in the analysed time period. The coefficient for this explanatory variable equals to -2.41e+10. This means that a rise in the country risk by 0.01 leads to a decrease in inward FDI by 241 million of US dollars. The above outcome is in line with previous expectations.

Table 21. A comparison of the FE model and the TFE model, with Driscoll-Kraay standard errors.

Variable	FE	TFE
market_size	-0.0136206	-0.177076
market_growth	**1.38e+10***	5.44e+08
exchange_rate	**2.16e+08****	**8.94e+07***
imports_GDP	**1.36e+10*****	**1.58e+10*****
CTR	1.78e+09	**1.48e+10***
labour_cost	**-1477035****	-350473
country_risk	6.58e+09	**-2.41e+10***
Railways	**1.01e+09****	**1.43e+09*****
Roads	**-9.36e+07***	**-1.24e+08***
_Iyear2005		**1.02e+09*****
_Iyear2006		**2.12e+09*****
_Iyear2007		**3.75e+09*****
_Iyear2008		**3.27e+09****
_Iyear2009		1.46e+09
_Iyear2010		6.18e+08
_Iyear2011		6.71e+08
_Iyear2012		-2.45e+08
_Iyear2013		**-3.00e+09****
_cons	**-1.85e+10*****	**-1.16e+10****
N	100	100
within R^2	0.24173877	0.42037594
Legend: * p-value < 0.05=α; ** p-value < 0.01= α; ***p-value < 0.001= α		

Source: own STATA calculations.

Furthermore, in the time-fixed effects model nine time dummy variables for the years 2005-2013 have been introduced in order to control for the effects of each individual year on the volume foreign

direct investment inflows. The results presented in Table 20 show that five from among those dummies significantly influence the inward FDI received by investigated countries. As compared to the value of foreign direct investment inflows recorded for the year 2004, in the years 2005, 2006, 2007 and 2008 it increased, and in the year 2013 it decreased. The coefficients on year dummies for 2009 and 2012 are insignificant. A detailed comparison of the results of the two estimated models is provided in Table 21 and Table 22.

Table 22. Verification of hypotheses.

Variable	Hypothesis	FE model	Conclusion	TFE model	Conclusion
market_size	**+**	Not significant		Not significant	
market_growth	**+**	**+**	Confirmed	Not significant	
exchange_rate	**+**	**+**	Confirmed	**+**	Confirmed
imports_GDP	**+**	**+**	Confirmed	**+**	Confirmed
CTR	**-**	Not significant		**+**	Not confirmed
labour_cost	**-**	**-**	Confirmed	Not significant	
country_risk	**-**	Not significant		**-**	Confirmed
railways	**+**	**+**	Confirmed	**+**	Confirmed
roads	**+**	**-**	Not confirmed	**-**	Not confirmed

Source: own STATA calculations.

Table 22 summarizes the results of the two estimated models and presents the verification of hypotheses stated at the beginning of this research for both of the regression methods employed for the purpose of the described study. As follows from this table, in the fixed effects model, the predictions concerning the positive influence of market growth, exchange rate and the share of imports in GDP, as well as the negative impact of labour cost on foreign direct investment inflows to central European countries in the time period 2004-2013 have been confirmed. The hypothesis regarding existence of a positive correlation between the length of roads per 100 km^2 and the volume of inward FDI have not been confirmed in the FE regression. Moreover, in Table 22 it can be found that in the fixed effects model market size, CTR and country risk turned out not to be significant as the determinants of foreign direct inflows to the analysed countries. When it comes to the time-fixed effects model, Table 22 shows that in this regression the previous hypotheses with regard to the positive correlation between the exchange rate, the share of imports in GDP, the length of railways per 100 km^2 of area and received FDI have been confirmed. However, the results obtained in the estimated TFE model have not confirmed the expected negative influence of corporate tax rate and positive impact of the length of roads per 100 km^2 of area on inward foreign direct investment. What is more, as can be seen in Table 22, labour cost, market growth and market size proved not to be significant as the explanatory variables in the proposed time-fixed effects model.

CONCLUSIONS

Since the turn of the eighties and the nineties, when the economic and political transformation in the former Soviet Union countries had been initiated, a tendency towards globalization has begun to intensify to an extent never observed before. One of the symptoms of the ongoing process has been continuous tightening of trade, investment and production relations between various countries in the world that gradually led to the creation and development of uniform global market. Furthermore, persistent technological advancement, especially in the area of communication, and trade liberalization, led to large scale economic expansion of transnational entrepreneurships and increased international flows of capital in the form of foreign direct investment.

Foreign direct investment (FDI) is a type of investment which aims at establishing a long-term relationship and a significant, meaning at least 10% of the voting power, degree of influence on the management between the direct investor and a direct investment enterprise that is a resident in other economy. The discussed type of investment activity involves inward and outward financial positions. Inward FDI is defined as an investment by a non-resident direct investor in a direct investment enterprise resident in the host economy and it takes one of two forms. It is either an acquisition, and then it is described as “brownfield investment”, or a foreign start-up, which is classified as “greenfield investment”.

This paper is a modest contribution to the ongoing discussion on the determinants of the inflow of foreign direct investment to central European economies. The focus of attention is on the time period between 2004 and 2013. The analysis has been carried out for ten EU member states, namely: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

On the basis of a thorough literature survey, hypotheses have been tested concerning the influence of various economic and non-economic factors on the volume of inward foreign direct investment located in each of the selected countries. Firstly, according to what has been presented in other studies on the issue, FDI inflows are expected to increase with the occurrence of improvements in the level of gross domestic product (GDP). Moreover, in the literature, it has been demonstrated that also GDP growth, appreciation of real exchange rate, high share of imports in GDP, and well-developed infrastructure (km of railways per 100 square km, km of roads per 100 square km) attract foreign direct investment to central European economies. Simultaneously, high levels of corporate tax rate, labour cost and considerable country risk, act as deterrents for FDI location in the region by multinational firms.

In order to investigate the potential determinants of foreign direct investment inflows to central European countries in the time period between 2004 and 2013, panel data approach has been employed. Based on the results of the Hausman test, which rejected the use of random effects model, two regressions have been estimated, namely the fixed effects (FE) model and the time-fixed effects (TFE) model. The set of explanatory variables included in both models consisted of the following factors: market size, market growth, exchange rate, imports as a share of GDP, corporate tax rate, labour cost, country risk, kilometres (km) of railways per 100 square kilometres and kilometres (km) of roads per 100 square kilometres.

After the descriptive analysis of the dataset used for the purpose of the discussed study, several diagnostic tests have been carried out. It has been found that there is a problem of heteroscedasticity

present in both estimated models. To overcome this difficulty robust standard errors have been applied. Further tests revealed no autocorrelation in the panel. However, Breusch-Pagan test of independence showed that there is cross-sectional dependence in the FE model and also in the TFE model. One possible solution to this problem is to adopt Driscoll and Kraay standard errors in the two regressions. The estimates it produces are robust to cross-sectional dependence, and also to heteroscedasticity.

The results of the fixed effects model with Driscoll and Kraay standard errors show that market size, corporate tax rate and country risk variables are not significant determinants of FDI inflows. Furthermore, the analysis indicates that there is a positive correlation between market growth, the exchange rate, imports as a share of GDP, km of railways per 100 square km and inward foreign direct investment. These outcomes are consistent with expectations. In agreement with initial predictions, labour costs negatively affect inward foreign direct investment. At the same time, contrary to what has been expected, the coefficient for the variable "km of roads per 100 square km" turned out to be negative.

In the time-fixed effects model three variables proved not to be significant as the factors influencing FDI inflows, namely: market size, market growth and labour cost. Similarly to the outcome obtained in the fixed effects regression, the coefficient for the length of roads (in km) per 100 square km of area is negative. Nevertheless, it is necessary to point out that in some aspects the results of the TFE model differ from the results of the FE model. The first dissimilarity concerns the influence of corporate tax rate on the volume of inward FDI. In the time-fixed effects regression it turned out to be positively related with foreign direct investment inflows, which contradicts the hypothesis drawn on the basis of the literature. However, in this place, it should be noted that the sensitivity of FDI to tax depends on the mobility of business activities underlying the tax base. Another difference as compared to the fixed effects model is that the results of TFE regression show that country risk associated with legal, political and economic environment is a deterrent of foreign direct investment inflows to central European countries in the analysed time period. This outcome is in consonance with expectations. Moreover, in this model, five time dummy variables significantly influence the volume of inward FDI. As compared to the value recorded for the year 2004, in the years 2005-2008 it increased and in 2013 it decreased.

Summing up the results, it can be concluded that the estimation outcomes obtained in this research are in good agreement with other studies presented in the literature survey. To our knowledge, this is the first investigation to deal with the determinants of foreign direct investment inflows to the selected ten central European countries, currently members of the EU, in the time period 2004-2013. Notwithstanding, more research in the determinants of foreign direct investment inflows is still necessary before obtaining a definitive answer to the question on what are the factors that influence the volume of inward FDI received by central European countries in the long time horizon. Thus, future work on the issue under scrutiny in this paper should involve estimation of the proposed fixed effects and time-fixed effects regression models for a time period that goes beyond the analysed ten years between 2004 and 2013. However, application of such an extension is limited because of lack of reliable data on some of the explanatory variables for the selected group of countries for the years preceding the year 2004, when most of those economies joined the European Union.

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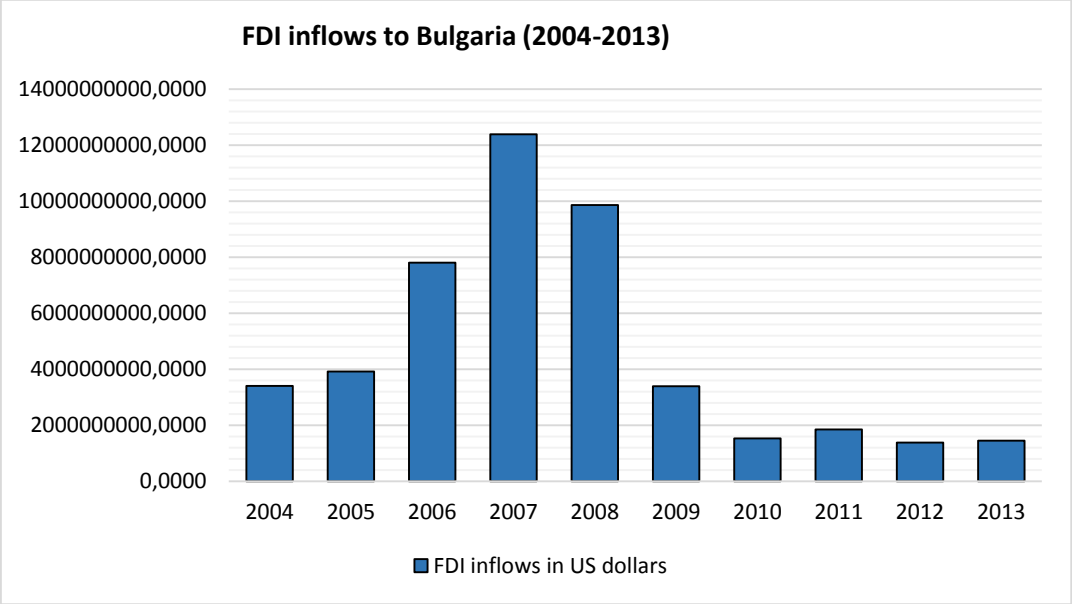
1. FDI inflows to Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia in the time period 2004-2013.



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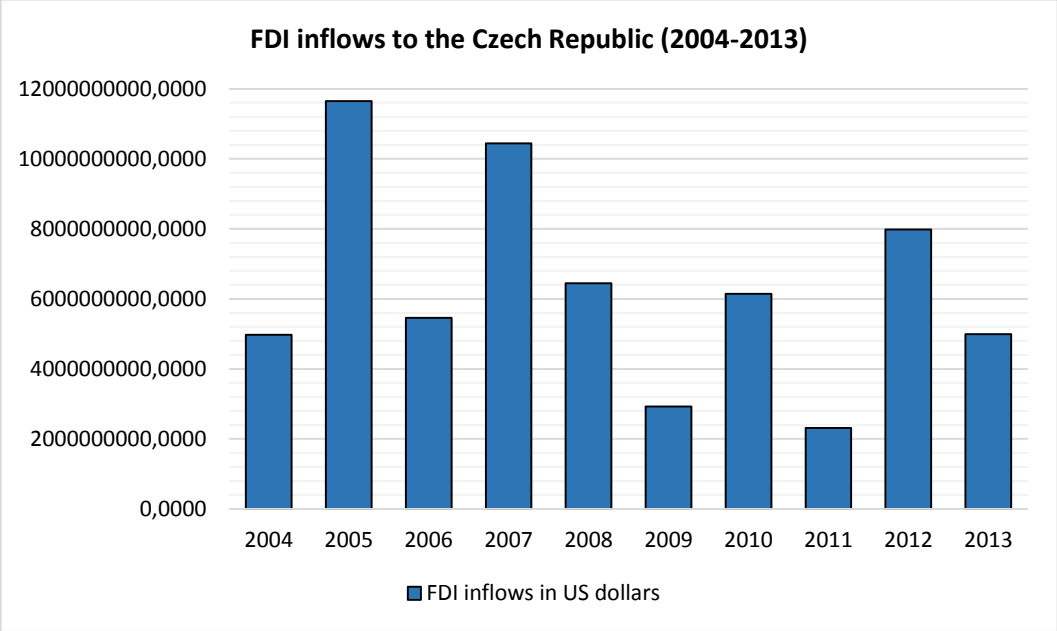

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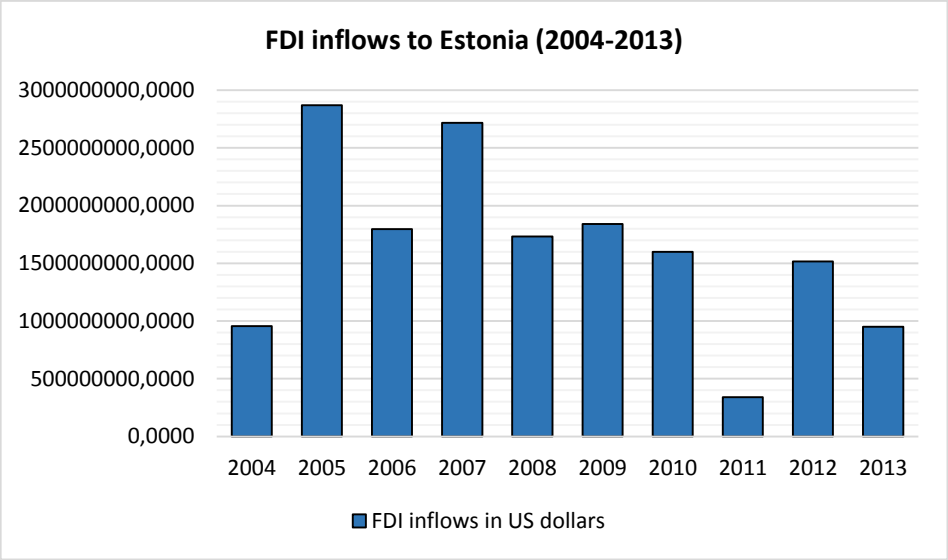

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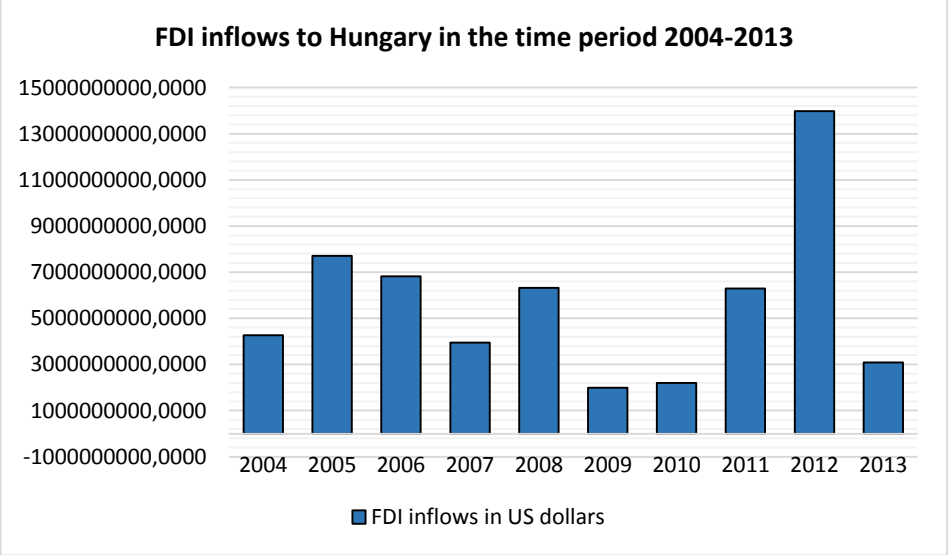

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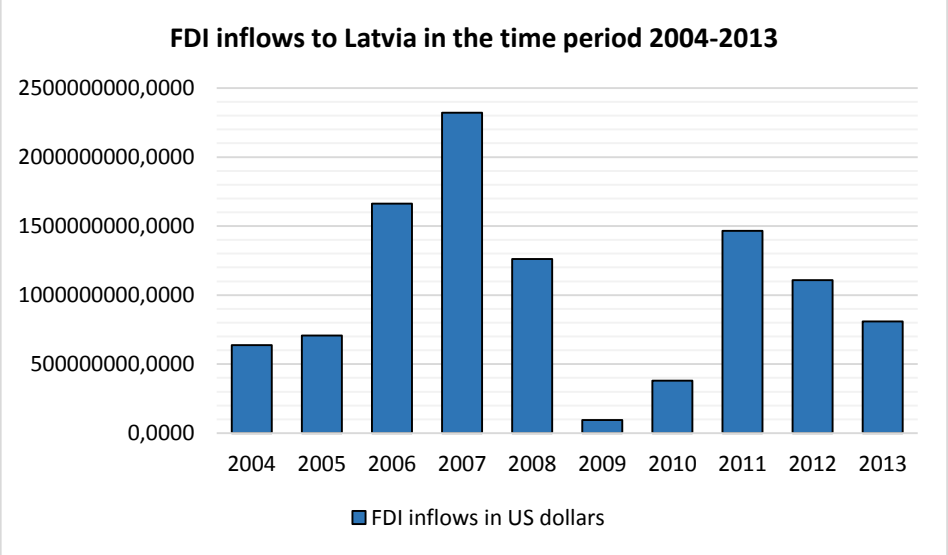

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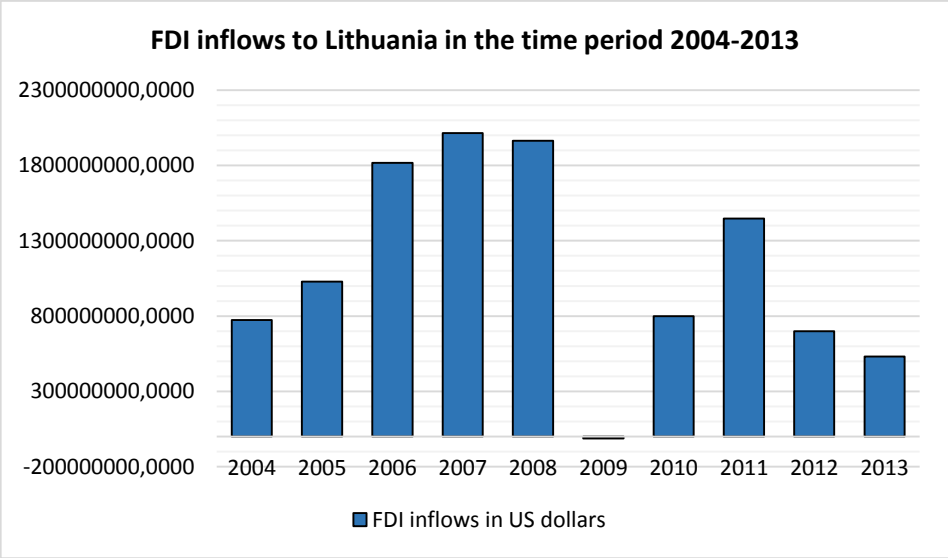

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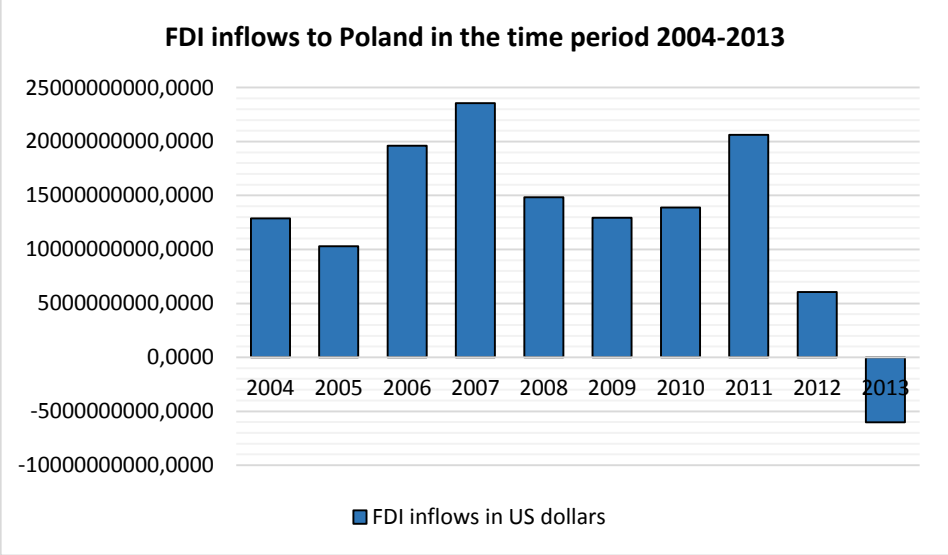

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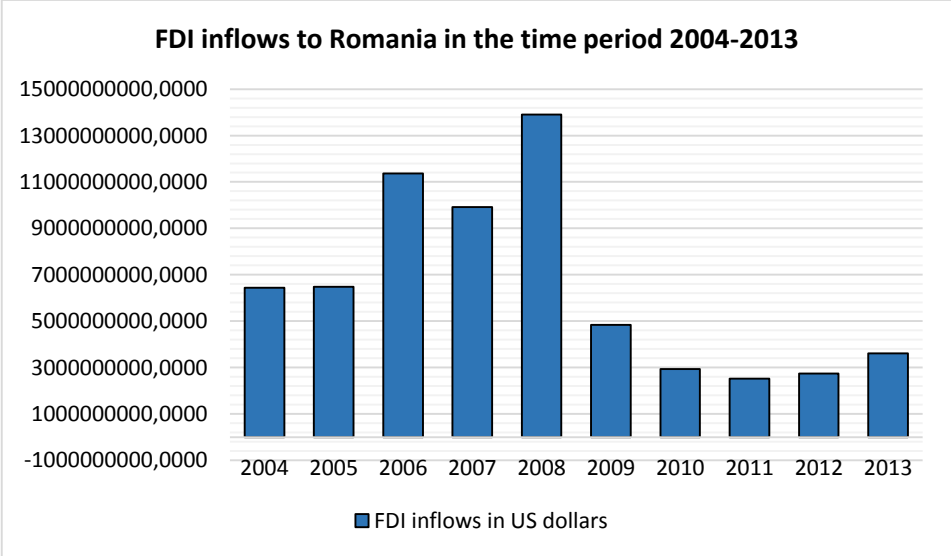

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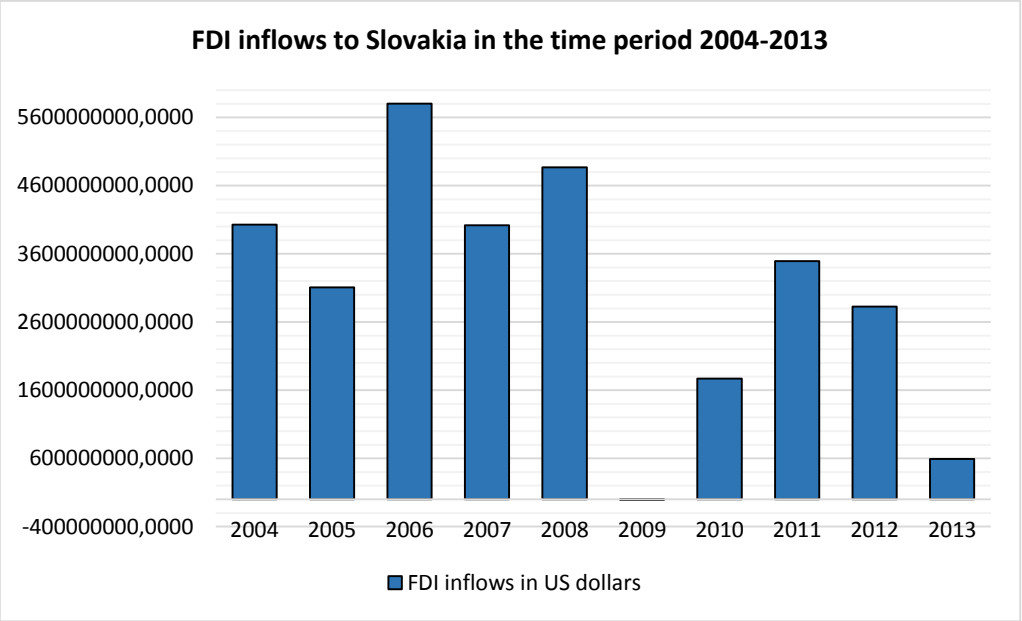

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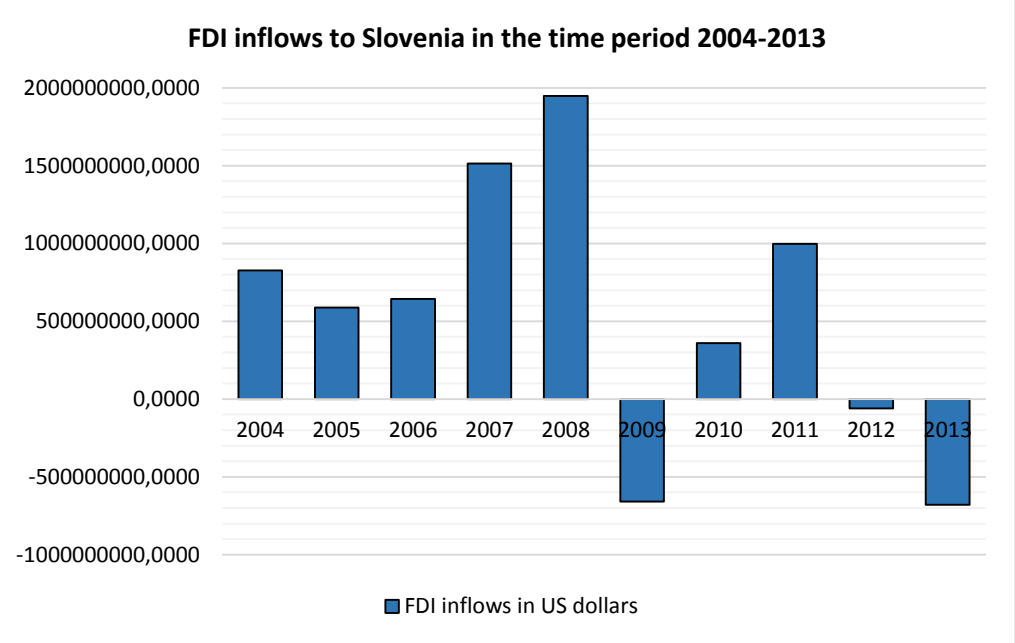

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ABSTRACT

In the modern world, as a consequence of continuously progressing technological advancement, especially in the area of communication and information infrastructure, and due to continuous globalization, we observe a significant intensification in international capital flows and knowledge diffusion in the form of foreign direct investment.

In recent years, much research on the determinants of foreign direct investment inflows has been done. However, the factors influencing the volume of inward FDI have been scarcely investigated from the perspective of current European Union member countries located in the centre of Europe, which in the last 25 years underwent transition from centrally planned to market economy. Moreover, very few publications can be found that address this issue in the time period after the year 2008, when the recent economic and financial crisis began.

This paper is a modest contribution to the ongoing discussion on the determinants of the inflow of foreign direct investment to central European economies. The focus of attention is on the time period between 2004 and 2013. The analysis has been carried out for ten EU member states, namely: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

On the basis of a thorough literature survey, hypotheses are formulated concerning the influence of various economic and non-economic factors on the volume of inward foreign direct investment in each of the selected countries. In order to investigate the potential determinants of FDI inflows two different types of panel data models, namely the fixed effects (FE) model and the time-fixed effects (TFE) model are employed.

Diagnostic tests reveal that there is a problem of heteroscedasticity and also cross-sectional dependence present in both models. To overcome these difficulties robust Driscoll and Kraay standard errors are applied.

In agreement with expectations, the results of the fixed effects model indicate a positive correlation between market growth, the exchange rate, imports as a share of GDP, length of railways per 100 square km of area and inward foreign direct investment. Moreover, in accordance with predictions, labour costs negatively affect FDI inflows. Contrary to what was expected, the coefficient for the length of roads per 100 square km of area is found to be negative.

In the time-fixed effects model, as it was predicted, the coefficients for exchange rate, imports as a share of GDP and the length of railways per 100 square km of area are positive. The results of the estimation also show that corporate tax rate is positively related with inward foreign direct investment, which contradicts the hypothesis drawn on the basis of the literature. What is more, the outcomes of the TFE regression suggest that country risk is a deterrent of FDI inflows to central European countries in the analysed time period. This conclusion however, stays in consonance with previous expectations.

To sum up, the estimation results obtained in this research are in good agreement with other studies. Moreover, to the author's best knowledge, this is the first investigation to deal with the determinants of foreign direct investment inflows to the selected ten central European countries, currently members of the EU, in the time period 2004-2013.

ABSTRAKT

In der gegenwärtigen Welt beobachten wir infolge der ständig fortschreitenden technologischen Entwicklung, insbesondere im Bereich der Kommunikation und Informationsinfrastruktur, und infolge der ständigen Globalisierung, eine erhebliche Intensivierung des internationalen Kapitalflusses und eine Wissensdiffusion in Form von unmittelbaren ausländischen Investitionen.

In den letzten Jahren wurden viele Forschungsarbeiten über die bestimmenden Faktoren des Zustroms der ausländischen Direktinvestitionen durchgeführt. Dennoch wurden die Faktoren, die auf die Größe der einströmenden ausländischen Investitionen Einfluss haben, nur wenig aus der Perspektive der in Mitteleuropa lokalisierten EU-Mitgliedstaaten erforscht, die in den letzten 25 Jahren die Transformation von der zentral gesteuerten Wirtschaft zur Marktwirtschaft erlebt haben. Außerdem kann man nur sehr wenige Publikationen finden, die dieses Thema nach dem Jahre 2008 ansprechen, in dem die letzte ökonomische und Finanzkrise ihren Anfang hatte.

Diese Arbeit bildet einen bescheidenen Beitrag zu der Diskussion über die Einflussfaktoren des Zustroms von ausländischen Direktinvestitionen in die mitteleuropäischen Wirtschaften. Ins Zentrum des Interesses rückt der Zeitraum zwischen 2004 und 2013. Die Analyse wurde für zehn EU-Mitgliedstaaten durchgeführt, im Einzelnen für: Bulgarien, Tschechen, Estland, Litauen, Lettland, Polen, Rumänien, Slowakei, Slowenien und Ungarn.

Aufgrund einer gründlichen Analyse der Literatur wurden Hypothesen formuliert, die den Einfluss der verschiedenen ökonomischen und nicht-ökonomischen Faktoren auf die Größe des Zustroms der ausländischen Direktinvestitionen in den ausgewählten Ländern betreffen. Zum Zweck der Untersuchung der potenziellen Faktoren, die den Zustrom der unmittelbaren ausländischen Investitionen determinieren, werden zwei Modelltypen für Paneldaten angewendet, nämlich das Modell mit fixen Effekten und mit fixen Zeiteffekten.

Diagnostische Tests ergeben, dass in den beiden Modellen das Problem der Heteroskedastie und der Abhängigkeit über den Querschnitt auftritt. Um diese Schwierigkeiten zu eliminieren, wurden die robusten Standardfehler nach Driscoll und Kraay berechnet.

Entsprechend den Erwartungen zeigen die im Modell mit fixen Effekten erhaltenen Resultate auf das Auftreten der positiven Korrelation zwischen Wirtschaftswachstum, Wechselkurs, dem Importanteil im Bruttoinlandsprodukt, der Länge von Bahnlinien, die auf 100 km^2 anfallen, und der Größe der einfließenden ausländischen Direktinvestitionen. Des Weiteren haben die höheren Arbeitskosten wie erwartet einen negativen Einfluss auf die Größe des Zustroms der ausländischen Direktinvestitionen. Wider Erwarten hat sich der Koeffizient für die Länge der Straßen, die auf 100 km2 der Fläche anfallen, als negativ erwiesen.

Im Modell mit fixen Zeiteffekten sind, wie vorausgesehen, die Koeffizienten für den Wechselkurs, den Importanteil im Bruttoinlandsprodukt und für die Länge von Bahnlinien, die auf 100 km2 der Fläche anfallen, positiv. Das Ergebnis der Schätzung zeigt auch, dass die Einkommenssteuer von juristischen Personen positiv mit dem Zufluss von ausländischen Direktinvestitionen korreliert ist, was der aufgrund der Literatur gestellten Hypothese widerspricht. Außerdem weisen die in der TFE-Regression erhaltenen Resultate darauf hin, dass das Risiko des Staates ein Faktor ist, der die ausländischen Investoren zum Anlegen des Kapitals in den mitteleuropäischen Ländern in dem analysierten Zeitraum entmutigt hat. Diese Schlussfolgerung bleibt jedoch mit den vorherigen Erwartungen übereinstimmend.

Zusammenfassend: die in dieser Arbeit erhaltenen Resultate der Schätzung stimmen in großem Maße mit den Resultaten anderer Forschung überein. Außerdem, nach Wissen des Autors, ist das die erste Forschung, welche die determinierenden Faktoren des Zuflusses der ausländischen Direktinvestitionen an die zehn ausgewählten mitteleuropäischen EU-Mitgliedstaaten im Zeitraum 2004-2013 betrifft.

Curriculum Vitae

Name	**Marta Barbara**
Surname	**Studzinska**
Nationality	Polish

Education:

2007 - 2010	**Waclaw Sierpinski High School in Gdynia**
2010 – 2013	**University of Warsaw** **Faculty of Economic Sciences** Completed full time studies in the field of Economics. Diploma of higher education first cycle programme. Final grade: very good The degree of: Lic.
2010 – 2013	**University of Warsaw** **Faculty of Management** Completed full time studies in the field of Management. Diploma of higher education first cycle programme. Diploma Honorificum quae Artis Moderandi et Ordinandi. Final grade: very good The degree of: Lic.
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2014 -	**University of Vienna** **Institut für Wirtschaftswissenschaften** Master studies, Economics sciences. Student mobility: CEEPUS (CIII-PL-0214)

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2012 – 2013	Membership in the International Economics and Equity Research Student Research Group at the Faculty of Economic Sciences at the University of Warsaw
IX 2013	Internship in Bank Gospodarstwa Krajowego (BGK) Operations and the settlement of accounts Centre.
X 2012 – X 2013	Representative in the Student Bursary Committee at the Faculty of Economic Sciences at the University of Warsaw

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German	Intermediate (B1)
Russian	Intermediate (B1)

Computer skills:

Microsoft Office

STATA

Matlab

Mathematica

Other skills:

GRE	General Test Scores: • Verbal reasoning 156 • Quantitative reasoning 158 • Analytical Writing 3.5
Driving licence	Category B