A COMPARATIVE ANALYSIS OF FOREIGN DIRECT INVESTMENT FACTORS

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Abstract. *The paper identifies factors affecting the foreign direct investment (FDI) inflow. It analyzes the determinants of FDI in recent empirical evidence as well as determines differences among FDI factors in Greece, Ireland, and the Netherlands. The determinants being examined are the gross domestic product (GDP) per capita, exchange rate, unit labor costs, trade openness as well as inflation. The analyzed period is 1974–2012. Data were collected from the World Bank and the Organization for Economic Cooperation and Development (OECD) databases. With the help of the VAR model it was determined that only the exchange rate had a significant impact on FDI in Greece. Exchange rate, trade openness and inflation had a slight impact on FDI in Ireland. GDP per capita, unit labor costs and inflation had a slight impact on FDI in the Netherlands. The introduction of euro and the financial crisis had a significant impact on FDI only in Greece. Furthermore, after comparison of public debt, the ease of doing business ranking, budget deficit and the corruption index among the countries, it was determined that the low level of FDI in Greece was caused by the unfavorable investment climate.*

Key words: *FDI factors, GDP, inflation, exchange rate, VAR model*

Introduction

The economic development requires huge financial resources. If local savings are low, the main government's objective is to attract capital from abroad. Foreign capital can finance investment, induce economic growth as well as increase the standard of living. With FDI, a host country does not have to diminish consumption in order to reduce the current account deficit. On the other hand, capital investments abroad can help investors to diversify their portfolios by investing in various countries. Consequently, they reduce the overall risk of their portfolio by diversifying it. FDI investors also acquire market access as well as lower cost inputs.

FDI flows increased significantly during the last three decades as companies are seeking new markets, a possibility to reduce risk by diversification, higher profitability. Not only foreign investors received benefits from FDI but also host countries boosted competitiveness, technological knowledge as well as diminished the unemployment rate. Free flows of capital across countries are beneficial for the economic development, because it allocates savings to its most productive use.

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The key factor in the process of choosing a target country for FDI is the investment climate. State governments develop a variety of projects and incentive programs in order to induce investors to direct their financial resources and technologies towards their countries. Over the years, more and more countries reduced restrictions hindering FDI inflow establishing a larger competition for foreign investments.

Furthermore, FDI should be perceived not only in the context of an individual investor or a country. This process is global and includes the whole world. FDI is considered as the main factor of the globalization of economic activity, because multinational companies establish subsidiaries in foreign countries and spread their culture among customers and workforce of the host country. Multinational companies invest into the countries where they expect to attain the highest possible return on investment. Foreign investors may combine their own ownership advantages with advantages acquired in host countries.

The aim of the paper is to identify the factors affecting FDI inflows. To reach this aim, the authors analyzed the forms of capital flows, FDI advantages in comparison with portfolio investment, the reasons for choosing a particular type of FDI. The task of the empirical research was using the VAR model to determine FDI factors and their peculiarities in different countries.

The paper is organized in the following order. The first section reviews the literature about the main forms of capital flow and differences among them. This section also studies FDI classification methods and theories revealing different opinions in economic literature. Furthermore, this section carries out the analysis of FDI factors revealed in empirical researches by various authors as well as a comparison of their results and empirical models. The second section defines the research item and process as well as data description, while the third section provides with the empirical results. Finally, the last section sums up the main findings and provides concluding remarks.

1. Review of literature on the content, forms and determinants of capital flows

Capital flows may take diverse forms, but the main forms are FDI, portfolio investment, and debt. FDI and portfolio investment are the two forms of capital flows that hold equity (Combes, Kinda, Plane, 2012; Kirabaeva, Razin, 2010; Bacchetta, Wincoop, 2000; IIF, 2013; Kasa, 2000). Bacchetta and Wincoop (2000) found that a bank lending to developing country governments and firms was a major form around 1970, while portfolio investment and FDI have become the dominant forms of capital flows since 1990. FDI is perceived as being a more favorable form of capital flows because of the volatility of other forms.

Kirabaeva and Razin (2010) emphasize the advantages of capital flows that have equity – FDI and portfolio investment – because of a larger stability as compared to other forms. The superiority is considered to be of FDI, as it comes with a more direct management control. Authors also emphasize the higher profitability and access to information about investment efficiency as the advantages of FDI. FDI inflows increase during a financial crisis because of low prices of domestic companies and assets while portfolio investment flows decrease (Kirabaeva, Razin, 2010). Investors choose the FDI form if they want to manage firms and be more informed about the prospects of their projects, and if a country has a higher asymmetric information risk. Kasa (2000) considers the presumption of the higher stability of FDI to be wrong. Combes, Kinda, and Plane (2012) analyze the impact of different forms of capital flows on the real exchange rate and also come to the conclusion that FDI is more beneficial than the portfolio investment. Thus, most authors state the advantages of FDI and its superiority against the portfolio investment.

As Cohen (2007) has noted, FDI can be defined in qualitative and quantitative terms. When a direct investor establishes subsidiary in a host country, he commits more than a relatively large amount of capital, he also commits its prestige. The direct investor transfers management skills, technology, production techniques to the host country. Increased jobs and export are associated with FDI as well (Cohen, 2007).

The investor is more likely to choose the FDI form, if the fixed cost of FDI is lower. When the costs of production increase, the overall profitability decreases and investment becomes less beneficial. According to Itay and Razin (2005), developed countries will have higher levels of production costs, thus they will attract more portfolio investments. Whereas, developing countries will attract more FDI, because production cost here is presumed to be lower. So, it is more beneficial to pay fixed costs associated with establishing FDI projects in these countries (Itay, Razin, 2005).

Because of its advantages, FDI distinguishes itself by the largest volume of investment relative to other capital flows. This form of investment requires more efforts and a higher level of involvement because of its long-term maturity. FDI is significant not only in the perspective of investor, but also globally. It is one of the main factors in the economic development of host countries.

Many developing countries try to remove restrictions on capital markets in order to attract more FDI and thus to induce the economic growth (Liaw, 2004). Determinants of each type of FDI are different; therefore, a host country has to promote specific sectors in order to attract the desirable FDI type. Benefits which will be brought to the host country by FDI also depend on the FDI form. Cohen (2007), Langvienė, Vengrauskas and Žitkienė (2011) as well as Protsenko (2003), classify FDI forms by the objective to resource-seeking, market-seeking, efficiency-seeking, strategic asset-seeking, by the role of the parent company to horizontal, vertical, etc.

Cohen (2007) points out that multinational companies, which choose the resource-seeking motivation, have a poor reputation, because all extracted materials are exported instead of selling them in a host country; furthermore, investors disregard the people and government of the host countries. Efficiency seeking investors are criticized for closing down companies at home and moving jobs to least developed countries where production costs are lower. Investors do not increase the overall skill or income levels of labor force, but they contribute to lower unemployment rates and higher exports. Market-seeking subsidiary is oriented to large, flourishing and growing markets. The investor brings not only the capital needed to build a factory, but also an advanced production technology, marketing know-how and environmental protection technologies. However, foreign investors may cause the bankruptcy of local enterprises, increase unemployment and allow foreign-owned companies to acquire a close or full monopoly on certain goods and services (Cohen 2007, Read 2007).

Some authors differentiate between the vertical and horizontal FDI. When a company transfers a portion of the home country production to subsidiaries in order to strengthen their competitive position globally, it represents the horizontal strategy of FDI. In case of vertical FDI, different levels of a product are manufactured by various specialized subsidiaries in one or more countries. Usually a company seeking vertical integration builds subsidiaries in free economic zones. The reasons for this are exemptions from import barriers, less restrictive business regulations and income taxes holidays (Cohen, 2007; Protsenko, 2003; Langvinienė, Vengrauskas, Žitkienė, 2011).

Why companies invest abroad instead of producing only at home? Manufacturing of goods in a country where labor and other costs are very low eliminates competitors from the host market. Companies invest, if they have competitive advantages in foreign markets, such as economies of scale, marketing and management knowledge as well as skills, superior technology (Langvinienė, Vengrauskas, Sekliuckienė, 2010). Cohen (2007) holds that two specific determinations have to be considered before investing abroad. The first determines monopolistic advantages – if they are sufficient to outweigh the disadvantages and risks incurred when investors were competing with foreign companies in their countries. The second determination is the assessment whether FDI will produce better long-term results than exporting, licensing, or creating joint ventures. Multinational companies depend on knowledge capital, therefore they internalize ownership-specific advantages, which results in larger volumes of FDI (Jadhav, 2012). Furthermore, Yalcin (2008) describes a two-country model in which exporters are confronted with higher variable costs than foreign direct investors due to transport costs. This theory states that countries should expand horizontally across borders if the advantage of access to the destination market outweighs the advantage from scale economies in manufacturing.

Before entering a new foreign market, the foreign direct investor in order to make a successful investment has to estimate the investment climate in the host country. Hence, a large number of studies focuses on the factors which influence and suppress FDI.

Alguacil and Orts (2001) investigate the relationship between the inward FDI and imports in Spain. To make analysis more accurate, authors include other factors: domestic demand with removed import, the price of imports relative to the consumption price index, and inflation in terms of the GDP deflator. Authors also include a dummy variable to account for Spanish integration in the EU. According to their findings, FDI is positively related with imports, while inflation and relative prices have a negative impact on FDI. Domestic demand was found to influence FDI insignificantly (Alguacil, Orts, 2001).

In another study, Shan (2002) picks out the output growth, exchange rate, labor costs, exports, labor supply, investment, energy consumption, and regional growth differences as independent variables for the model. The author determines that two-way-causality exists between FDI and output growth, but the impact of output growth on FDI is much stronger than the impact of FDI on output growth. Labor costs and the choice of location are proved to be determinants of FDI, while no significant relationship between FDI and other variables was found (Shan, 2002).

Alkhasawneh (2013) analyzes the causality relationship and its direction between the FDI inflows as a percentage of GDP and the economic development as measured by GDP per capita. The author finds a strong and positive relationship between GDP per capita and FDI inflows. He also concludes that there is a bi-directional causality between FDI and GDP per capita for one, two and three year lags (Alkhasawneh, 2013). Georgantopoulos and Tsamis (2011) also investigate the relationship between GDP per capita and FDI flows in Greece. Contrary to Alkhasawneh (2013), these authors find out that there is no bi-directional causality between FDI and GDP, but GDP per capita causes the FDI in one and two year lags.

Agiomirgianakis, Asteriou, and Papathoma (2003) examine the influence of real GDP growth, GDP per capita, the share of FDI in GDP, government expenditures, the openness of the economy, human capital and physical infrastructure in OECD countries. The authors choose the share of FDI to GDP ratio as a dependent variable. Their results suggest that human capital, captured as the ratio of pupils on secondary education over the total active population, has a positive effect on FDI. GDP growth and GDP per capita, which are proxies of the level of development and size of the market, show a positive influence on FDI. The study also reveals that FDI is positively affected by its own past values, infrastructure and trade openness, which is defined as the ratio of trade flows over GDP. Government expenditures have no significant influence on FDI.

Blonigen and Piger (2011) opt the FDI stock, OECD mergers and acquisition, worldwide mergers and acquisitions as dependent variables in their analysis of FDI determi-

nants. The authors do not include the exchange rate or changes in recent consumer prices in their research due to willingness to investigate only long-run determinants. They find out that the GDP of a foreign investor country and the host country, the distance between the two most populous cities in the home and the host countries, the common official language, the common language overlap, colonial relationship, GDP per capita in the home country, average education years, relative labor endowments and regional trade agreements have an effect on FDI. The authors find no robust evidence that policy variables, such as multirateral trade costs, business costs, infrastructure, political institutions have an influence on FDI. However, variables such as regional trade agreements, customs unions and service agreements, are found to have an impact on FDI in the case of mergers and acquisitions. Eicher, Helfman, and Lenkoski (2011) have also determined that the common language and the host country's level of development have an influence on FDI. Contrary to Blonigen and Piger (2011), the authors do not find that trade agreements, educational differences have a significant impact on FDI, while taxes, financial risk and corruption have an effect on FDI.

Jadhav (2012) investigates the impact of economic, institutional and political factors. As a dependent variable, he selects the FDI inflow. The inflation rate, trade openness represent policy variables. Corruption, voice and accountability as well as the rule of law represent institutional variables. Political stability, government stability and regulatory quality are proxies for political risk. The author also includes the market size, which is represented by GDP, and natural resource availability, which is represented by the share of minerals and oil in total export. The author reveals results similar to those of Agiomirgianakis, Asteriou and Papathoma (2003) – trade openness and GDP have a positive impact on FDI. Contrary to the research results of Alguacil and Orts (2001), inflation affects FDI positively. Jadhav (2012) also finds out that voice and accountability as well as natural resource availability have a negative effect on FDI. Other variables do not influence FDI significantly.

Meon and Sekkat (2012) analyze the effect of political risk on FDI. The authors take as a dependent variable the country's share in the world FDI. In order to make their research more precise, the authors include control variables to the specification, such as a country's GDP to the world's GDP in percentage, GDP per capita, GDP growth in percentage, trade openness and infrastructure, which is the number of telephone lines per 100 inhabitants. Their results suggest that the impact of political risk on FDI should be lower when there is more FDI worldwide, but in general the influence of political risk on FDI is negative. The authors find that political risk should be disregarded when the FDI activity is very large worldwide. Busse and Hefeker (2005) also explore linkages among political risk, institutions, and FDI. The authors employ not only indicators for political risk, but also gross national income (GNI) per capita, the real growth rate of GNI per capita, trade openness,

inflation. They choose as a dependent variable FDI net inflows per capita. The authors find that government stability, law and order, the quality of bureaucracy, investment profile, internal and external conflicts, ethnic tensions and democratic tensions determine FDI.

Hunady and Orviska (2014) focus on the influence of corporate tax on FDI in the EU countries. FDI inflows to GDP in percentage are selected as a dependent variable. They employ many variables to their model, including firing costs and public debt, which were not included in the analysis of the previous authors. They conclude that the corporate tax is not an important determinant of FDI but discover that public debt positively influences FDI, because countries with a higher public debt have a better infrastructure. Trade openness and GDP per capita influence FDI positively, while labor costs, firing costs and the dummy variable, which accounts for crisis, are explored to have a negative impact on FDI.

Different authors apply various models to determine the FDI factors. Shan (2002) applies the impulse response function and variance decomposition within the VAR model in order to analyze the dynamic relationship among the variables. Alguacil and Orts (2001) apply the VAR and cointegration technique. They state that the advantage of VAR is that it treats every variable as endogenous and examines relationships among all of them. As the authors detect that the series are cointegrated, they employ the vector error correction model (VECM) and analyze the short-run and long-run Granger causality. Alkhasawneh (2013), Georgantopoulos and Tsamis (2011) employ the Johansen cointegration test for a time series in order to detect if a long-run stable relationship exists among variables. Further, they conduct the Granger-causality test to explore if a bi-directional causality exists among the time series. Agiomirgianakis, Asteriou and Papathoma (2003) conduct a panel data regression. They use three different methods: common constant, fixed, and random. The common constant method assumes that there are no differences among the economies, the fixed effects model captures temporally country level effects and the results obtained by applying random effects are compared with the results obtained by applying fixed effects. Jadhav (2012), Hunady and Orviska (2014) also employ fixed effects, cross-sectional and period-fixed effects panel data regression. Blonigen and Piger (2011) employ the Bayesian Model Averaging to examine the model uncertainty surrounding FDI stocks in a cross-section, whereas Eicher, Helfman and Lenkoski (2011) analyze the dynamics of FDI flows by employing the Heckit Bayesian Model Averaging. Meon and Sekkat (2012) apply the generalized method of moments technique and the lagged values of response and explanatory variables, because some of the latter ones may be endogenous with respect to the dependent variable. Busse and Hefeker (2005) employ the Arellano–Bond generalized method of moments.

Most authors use the FDI to GDP ratio in percentage as a form of dependent variable. Most common explanatory variables that are included in models are such economic indicators as GDP, GDP per capita, inflation, labor costs, and trade openness. In order

to determine explanatory variables for FDI and their significance in models, authors employ different approaches. The Bayesian Model Averaging is conducted in order to detect which variables have a meaningful influence on FDI, whereas VAR, VECM and the generalized method of moments help to explore the weight and direction of causality for a single country and the panel data analysis for a group of countries.

2. Data and model analysis specification

The objective of the research is to study the factors influencing FDI in three different countries – Greece, Ireland, and the Netherlands. The reason for choosing these countries was their similarity in size and distinction in their economic performance and the volume of FDI inflows. All three countries demonstrate different economic development patterns during the period 1974–2012. Greece's economy didn't exhibit the economic growth as rapid as the Irish economy, and it was not as the stable as economy of the Netherlands. The economic indicators of Greece were worst as compared to those of the other selected countries. Greece and Ireland had a similar starting position when they joined the EU, but after that Ireland demonstrated a high growth as a result of fiscal consolidation and increased investment (Magoulios, Exarchos, 2011). All countries experienced a burden of financial crisis in 2007–2008, which directed Greece and Ireland to a debt crisis.

FDI inflows into Greece were significantly lower in comparison with other countries. The Bureau of Economic and Business Affairs (2012) has stated that the investment climate in Greece is inferior due to the government deficit, increasing public debt, and continuing recession. Corruption and an excesive government regulation are impeding factors for investments. According to Transparency International, the Corruption Perception Index in 2012 in this country was very low in comparison with other countries, meaning that people perceive the private sector to be higly corrupted (Greece – 36, while Ireland – 69, the Netherlands – 84). Greece among the world economies also distinguishes itself by a very low position in the Ease of Doing Business rating done by the WB, while Ireland characterizes itself as having a very favorable environment for business (in 2012 Greece was the 100th, Ireland the 10th, the Netherlands the 31st).

The WB statistics indicates that a Greece had budget deficit during almost the entire period of 1995–2012, while Ireland and the Netherlands had a budget surplus. Ireland had a budget deficit only during the financial crisis of 2008–2012. This indicator may be one of the reasons for the low FDI inflows to Greece, because it alerts about instability in the country. The WB data also reveal a large public debt in Greece in 1998–2012, exceeding 100 % of GDP which also indicates instability in the country. Public debt in Ireland started to increase in 2008 as a result of the financial crisis, while the Netherlands maintained a relatively stable public debt even during the economic crisis. However, this budget deficit and the public debt indicators were not included in the VAR model due to the lack of data.

According to Fig. 1, Ireland had the largest FDI inflows. In the period 1997–2000 they rose considerably due to the implementation of the country's industrialization strategy since 1980. Ireland used various fiscal and financial incentives and improved the level of education (UNCTAD). A sharp decrease in FDI in 2004 was linked to high FDI growth rates in developing countries as investors in order to reduce costs and improve competitiveness in the emerging markets. The decline is largely explained by a fall in the inward equity investment and reinvested earnings (UNCTAD, 2005). A drop in FDI inflows was observed in 2008 when Ireland's economy entered into a recession.
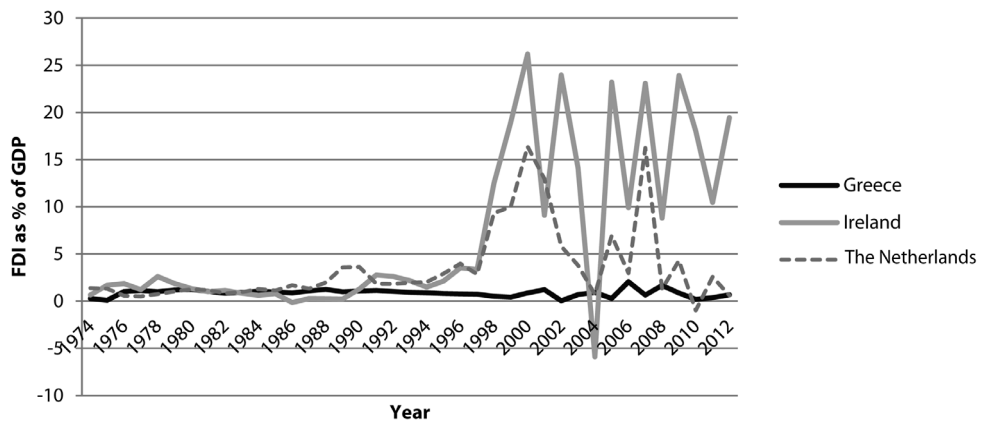

FIG. 1. **FDI as a percentage of GDP**

Source: the World Bank data.

The Netherlands didn't experience such large FDI inflows as Ireland. A sharp increase was observed in 2000 when a considerable rise of FDI net inflows was also observed worldwide. A dramatic decline was noted in 2004 as was the case with FDI inflows to Ireland. Statistics Netherlands (2012) linked the peak of FDI in 2007 to the takeover of ABN AMRO by foreign banks and the decline in 2008 to the acquisition of the Dutch part of the Belgian Fortis by the Dutch government (Statistics Netherlands, 2012).

Figure 2 shows trade openness in each country. The highest level of trade openness during the period was in Ireland and the lowest in Greece. Bower, Michou, and Ungerer (2014) state that the Greek export is 1/3 less in comparison to what regular international trade patterns would predict on the basis of country's GDP and other factors. They have assessed that the poor Greek export performance may be explained by a weak institutional quality, which is determined by the global competitiveness indicator doing business distance to the frontier indicator, the governance indicator, the sustainable governance indicator (Bower, Michou, Ungerer, 2014).
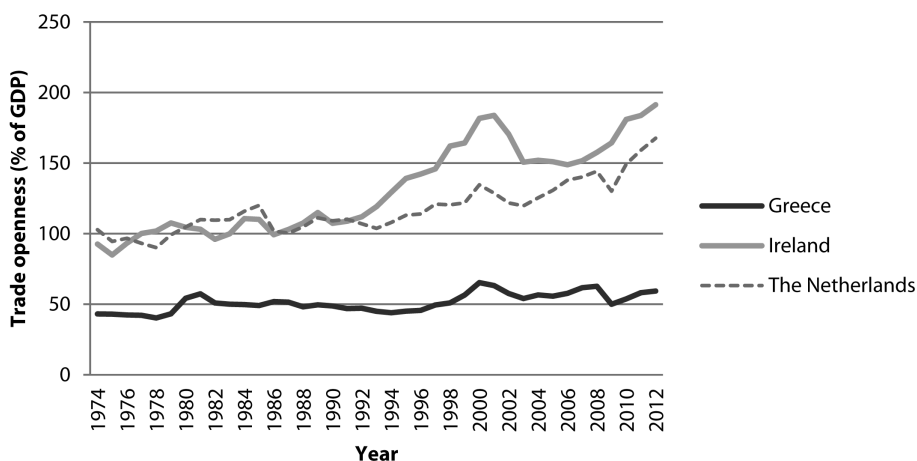
FIG. 2. **Trade openness**

Source: the World Bank data.

The research carried out by the authors analyzes how FDI factors vary among countries with different economic performance and what consequences the financial and debt crisis had on FDI. In order to account for bi-directional causalities and dynamic interactions among different variables, the VAR model was used for the analysis. According to Lutkepohl and Kratzig (2004), the vector autoregressive process is a model for a small or moderate size of a time series sample. Usually, all variables are treated as endogenous in this model. This model is flexible and easy to use for a dynamic multivariate time series and is constructed of simultaneous equations. A dependent variable is not only explained by explanatory variables, but also the latter are explained by variables they are used to determine. The model considers a bi-directional causality among the variables, so it helps to avoid the simultaneity bias, and the estimates provided by the model are more reliable.

Three VAR models will be estimated using annual data over the period 1974–2012. The data were collected from the World Bank and OECD databases. The following variables were included in the VAR model:

- *FDI* – net inflows of the FDI to GDP ratio (in %). This variable indicates how large FDI inflows are in comparison to GDP. The net inflows of FDI illustrate new investment inflows and less disinvestment in the reporting economy from foreign investors;
- *GDP* – GDP per capita expressed in constant 2005 prices and converted to US dollars using PPP. GDP per capita indicates the welfare of people in the economy and the standard of living in the country;
- *ER* – exchange rate determined by national authorities, or the rate determined in the legally sanctioned exchange market, measured as US dollar units relative to the local currency units;

- *ULC* – unit labor costs adjusted by the annual exchange rate. This measure is obtained by converting the total labor costs to the USD and dividing by real output, which was also converted to the USD. The increasing unit labor costs mean that the productivity and the competitiveness are decreasing;
- *TRADE* – a sum of export and import as a percentage of GDP. It indicates trade openness. This indicator shows how favorable are the conditions for foreign trade and foreign investment in the country;
- *INFL* – inflation rate, measured by the annual growth rate of the GDP implicit deflator. It demonstrates the rate of price change in the economy as a whole and indicates economic performance.

With reference to the analyzed literature, signs of relationship between the response variable and explanatory variables are determined. It is expected that GDP per capita, ER and TRADE have a positive while others a negative impact.

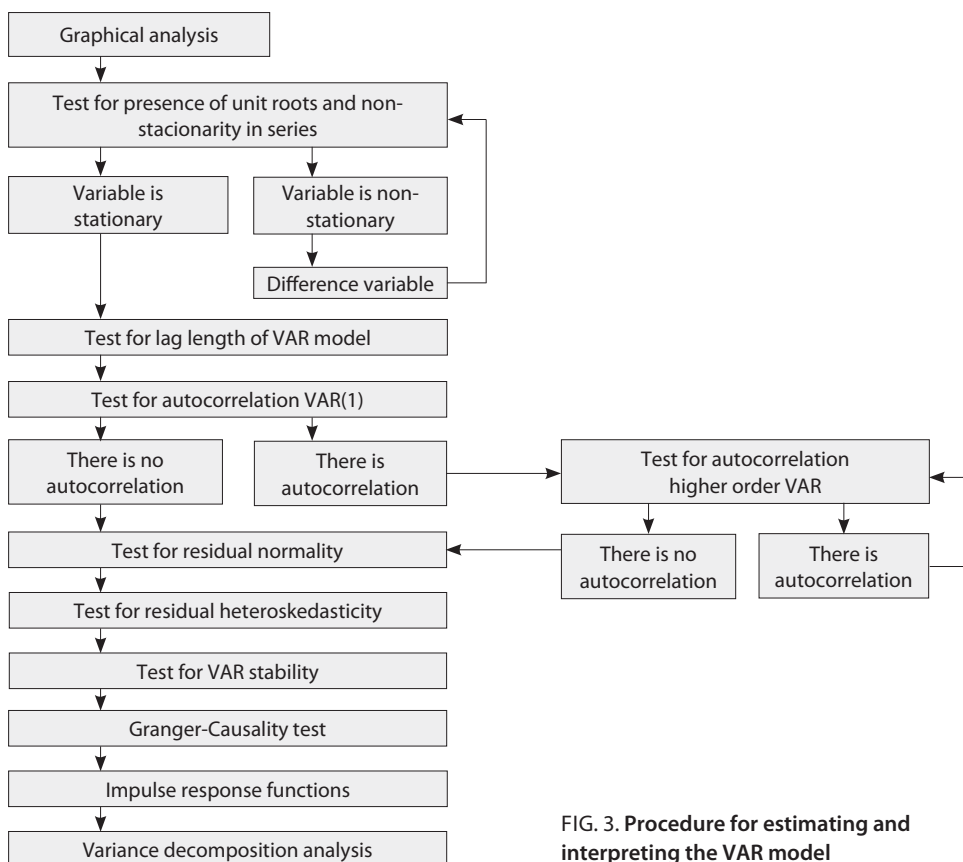Figure 3 presents steps performed in the analysis of FDI factors in Greece, Ireland, and the Netherlands.

FIG. 3. **Procedure for estimating and interpreting the VAR model**

After graphical analysis, the GDP and ULC time series were logged before including them in the models. A test for the presence of unit roots and non-stationarity in a series revealed that all variables, except for INFL, contained a unit root and were differenced. After the other diagnostic tests had been performed, the second-order VAR model was specified as below.

$$
\begin{bmatrix} DFDI_t \\ DLGDP_t \\ DER_t \\ DLULC_t \\ DTRADE_t \\ INFL_t \end{bmatrix} = A_0 + A_1 \begin{bmatrix} DFDI_{t-1} \\ DLGDP_{t-1} \\ DER_{t-1} \\ DLULC_{t-1} \\ DTRADE_{t-1} \\ INFL_{t-1} \end{bmatrix} + A_2 \begin{bmatrix} DFDI_{t-2} \\ DLGDP_{t-2} \\ DER_{t-2} \\ DLULC_{t-2} \\ DTRADE_{t-2} \\ INFL_{t-2} \end{bmatrix} + A_3 EURO + A_4 CRISIS + u_t \qquad (1)
$$

Here, A_0 is a vector of constant terms, $A_{i=1,2,3,4}$ are all matrices of parameters, u_t is an unobservable error term, *EURO* is a dummy variable which accounts for the introduction of euro, *CRISIS* is a dummy variable which accounts for the financial crisis.

After model specification, the Granger-causality test is performed. This test provides the direction of causality among the variables. Variables GDP_t, ER_t, ULC_t, $TRADE_t$, $INFL_t$ are considered to Ganger cause FDI_t, if FDI_t can be predicted with a greater accuracy by using the lagged values of the GDP_t, ER_t, ULC_t, $TRADE_t$, $INFL_t$ variables rather than not using such values. In order to determine the causality direction, the hypotheses below are tested.

H_0: $GDP_t, ER_t, ULC_t, TRADE_t$ or $INFL_t$ does not cause FDI_t;

H_1: $GDP_t, ER_t, ULC_t, TRADE_t$ or $INFL_t$ does cause FDI_t.

H_0: FDI_t does not cause $GDP_t, ER_t, ULC_t, TRADE_t$ or $INFL_t$;

H_1: FDI_t does cause $GDP_t, ER_t, ULC_t, TRADE_t$ or $INFL_t$.

In order to determine if a null hypothesis can be accepted at a 95 % significance level, the probability value of the calculated chi-squared statistics will be compared to 0.05. If the probability value is more than 0.05, the null hypothesis will be accepted. Otherwise, the alternative hypothesis will be accepted and the existence of causality among the variables will be concluded.

Impulse response functions analyze dynamic interactions among the variables. Moving average representation is a tool to examine the interaction among the sequences of variables. Considering the VAR model (1) with six endogenous variables FDI_t, GDP_t, ER_t, ULC_t, $TRADE_t$, $INFL_t$ moving average representation is presented below.

$$
\begin{bmatrix} FDI_t \\ GDP_t \\ ER_t \\ ULC_t \\ TRADE_t \\ INFL_t \end{bmatrix} = \begin{bmatrix} \overline{FDI} \\ \overline{GDP} \\ \overline{ER} \\ \overline{ULC} \\ \overline{TRADE} \\ \overline{INFL} \end{bmatrix} + \sum_{p=0}^{\infty} \begin{bmatrix} \phi_{11}(p) & \cdots & \phi_{16}(p) \\ \vdots & \ddots & \vdots \\ \phi_{61}(p) & \cdots & \phi_{66}(p) \end{bmatrix} \begin{bmatrix} \epsilon_{FDIt-p} \\ \epsilon_{INFLt-p} \end{bmatrix} \qquad (2)
$$

The elements ϕ_{11}, $\phi_{12},\ldots, \phi_{66}$ in equation (2) represent the impulse responses of the components FDI_t, GDP_t, ER_t, ULC_t, $TRADE_t$, $INFL_t$ with respect to the σ_{FDIt}, σ_{GDPt}, σ_{ERt}, σ_{ULCt}, σ_{TRADEt} and σ_{INFLt} shocks. With reference to Walter (1995), plotting impulse response functions are a way to see the behavior of the series in response to various shocks. If the processes FDI_t, GDP_t, ER_t, ULC_t, $TRADE_t$ and $INFL_t$ are integrated of the zero order, ϕ_i converges to zero when p converges to ∞. With reference to Lutkepohl and Kratzig (2004), the effect of impulse is temporary and dies out over time.

The forecast error variance decomposition contains the n-step ahead of the forecast error of a variable sequence and the n-step ahead of the forecast error variance of a variable sequence. Analysis explains us what part of movements in a sequence is induced by its own shocks and by shocks to other variables. It analyzes dynamic relationships among the variables.

The n-step ahead of the forecast error variance of FDI_{t+n} is denoted as $\sigma_{FDI}(n)^2$, which is calculated by using equation (2).

$$\sigma_{FDI}(n)^2 = \sigma_{FDI}^2[\phi_{11}(0)^2 + \phi_{11}(1)^2 + \cdots + \phi_{11}(n-1)^2] + \cdots$$
$$+ \sigma_{INFL}^2[\phi_{16}(0)^2 + \phi_{16}(1)^2 + \cdots + \phi_{16}(n-1)^2]$$

Respectively, the proportions of $\sigma_{FDI}(n)^2$ due to shocks in the σ_{FDIt}, σ_{GDPt}, σ_{ERt}, σ_{ULCt}, σ_{TRADEt}, σ_{INFLt} sequences are:

$$\frac{\sigma_{FDI}^2[\phi_{11}(0)^2 + \phi_{11}(1)^2 + \cdots + \phi_{11}(n-1)^2]}{\sigma_{FDI}(n)^2}$$

$$\frac{\sigma_{GDP}^2[\phi_{12}(0)^2 + \phi_{12}(1)^2 + \cdots + \phi_{12}(n-1)^2]}{\sigma_{FDI}(n)^2}$$

$$\frac{\sigma_{ER}^2[\phi_{13}(0)^2 + \phi_{13}(1)^2 + \cdots + \phi_{13}(n-1)^2]}{\sigma_{FDI}(n)^2}$$

$$\frac{\sigma_{ULC}^2[\phi_{14}(0)^2 + \phi_{14}(1)^2 + \cdots + \phi_{14}(n-1)^2]}{\sigma_{FDI}(n)^2}$$

$$\frac{\sigma_{TRADE}^2[\phi_{15}(0)^2 + \phi_{15}(1)^2 + \cdots + \phi_{15}(n-1)^2]}{\sigma_{FDI}(n)^2}$$

$$\frac{\sigma_{INFL}^2[\phi_{16}(0)^2 + \phi_{16}(1)^2 + \cdots + \phi_{16}(n-1)^2]}{\sigma_{FDI}(n)^2}.$$

If $\sigma_{FDIt}, \sigma_{ERt}, \sigma_{ULCt}, \sigma_{TRADEt}, \sigma_{INFLt}$ shocks do not explain the forecast error variance of sequence FDI_t at all forecast horizons, it is said that the FDI_t sequence is exogenous.

3. Empirical results

Dynamic relationships among variables were determined by Granger causality test as well as the analysis of variance decomposition and impulse response functions.

Granger-causality test. Results of Granger-causality test are presented in Table 1. Results show which of explanatory variables Granger-causes FDI.

TABLE 1. **Results of the Granger causality test**

Variable	Greece		Ireland		The Netherlands	
	Chi-sq	Prob.	Chi-sq	Prob.	Chi-sq	Prob.
DLGDP	1.429765	0.4892	0.154891	0.9255	1.095503	0.5782
DER	6.012567	0.0495	1.859253	0.3947	1.006083	0.6047
DLULC	0.825713	0.6618	0.499494	0.7790	1.707714	0.4258
DTRADE	1.366796	0.5049	3.937792	0.1396	1.125083	0.5698
INFL	0.680924	0.7114	1.701528	0.4271	2.490861	0.2878
All	11.57223	0.3147	9.695546	0.4676	10.57882	0.3913

Table 1 identifies that only exchange rate Granger causes FDI in Greece. H_0 hypothesis, saying that exchange rate do not cause FDI, is rejected at 95 % significance level, because 0.0495 < 0.05. Granger causality between FDI and any other variable is not determined in Ireland and the Netherlands.

Impulse response functions. Below impulse response functions are analyzed. They reveal dynamic interactions between the variables.

Figure 4 presents impulse response functions, which reveal impulses of FDI to shocks in FDI itself, GDP, ER, TRADE, ULC and INFL in Greek model. According to impulse response functions, shock to FDI has contemporaneous positive effect on FDI itself, which becomes negative in next period ($t + 1$). The impact of shock to FDI becomes positive in period $t + 2$, but this impact is insignificant as well as impact in further periods, because borders of standard errors vary around zero. It is observed that shock to exchange rate has negative effect on FDI in next period. This means that currency appreciation in the period t will induce the decrease of FDI in the period $t + 1$. This observation is confirmed by FDI theories stating that weak currency stimulate FDI inflows as foreign investors experience lower costs. The impact of shock to exchange rate will die out in further periods and will not have significant impact on FDI. Response of FDI to shocks to other variables is very negligible and insignificant as borders of standard errors vary around zero.
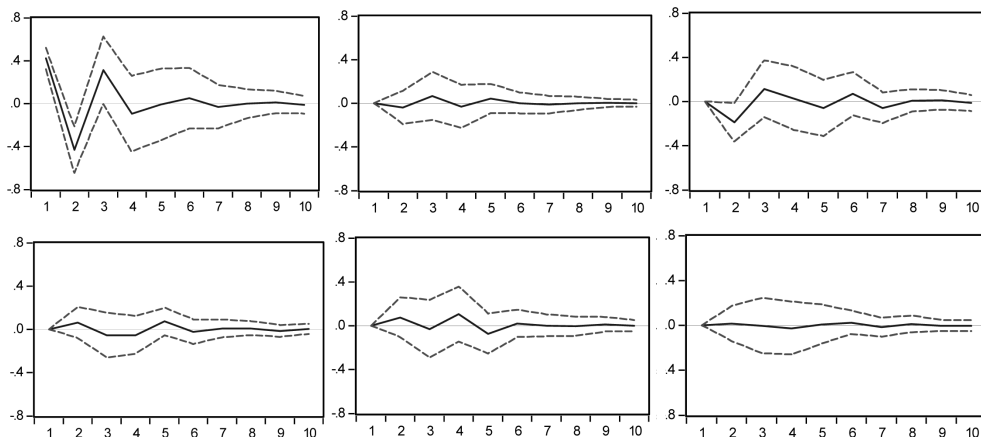
FIG. 4. **Responses of FDI to shocks in FDI, GDP, ER, TRADE, ULC and INFL, the Greek model**

Figure 5 presents impulse response functions indicating responses of FDI to shocks in the FDI itself, GDP, ER, ULC, TRADE and INFL in the Irish model. Shock to FDI has a contemporaneous and positive impact on FDI itself. The impact of shock on FDI becomes negative in the next period. The impact of shock is insignificant in the further periods. The effect of shock on FDI itself is greater in Ireland than in Greece. The impact varies between -5% and 5% in Ireland, whereas the effect of FDI shock in Greece varies only between -0.4% and 0.4% (Fig. 4). This may be explained by the closed Greek economy and relatively low inflows of FDI. The response of FDI to shocks to other variables is very negligible and insignificant as the borders of standard errors vary around zero.
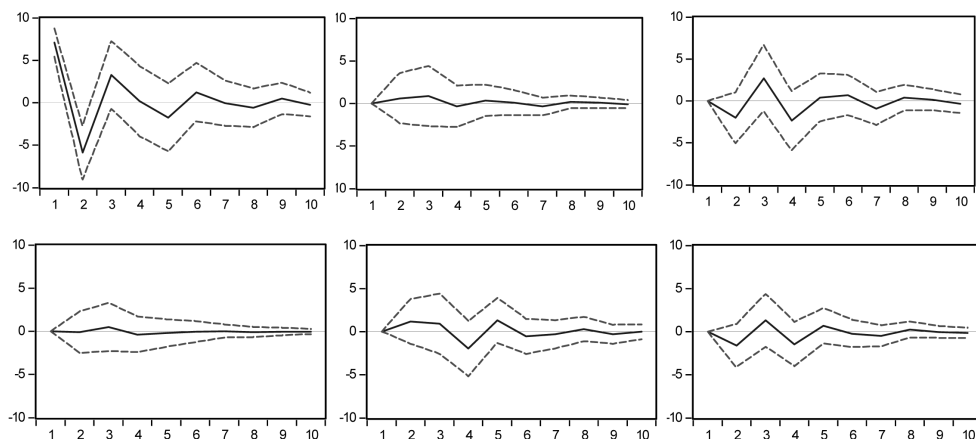

FIG. 5. **Responses of FDI to shocks in FDI, GDP, ER, TRADE, ULC and INFL, the Irish model**

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Figure 6 presents impulse response functions revealing responses of FDI to shocks in the FDI itself, GDP, ER, ULC, TRADE and INFL in the Dutch model. The impact of shock on FDI has a contemporaneous and positive effect on FDI itself. The impact of shock on FDI in further periods is negligible as the borders of standard errors vary around zero. The impact of shock on the other variables of FDI is also insignificant for the same reason.
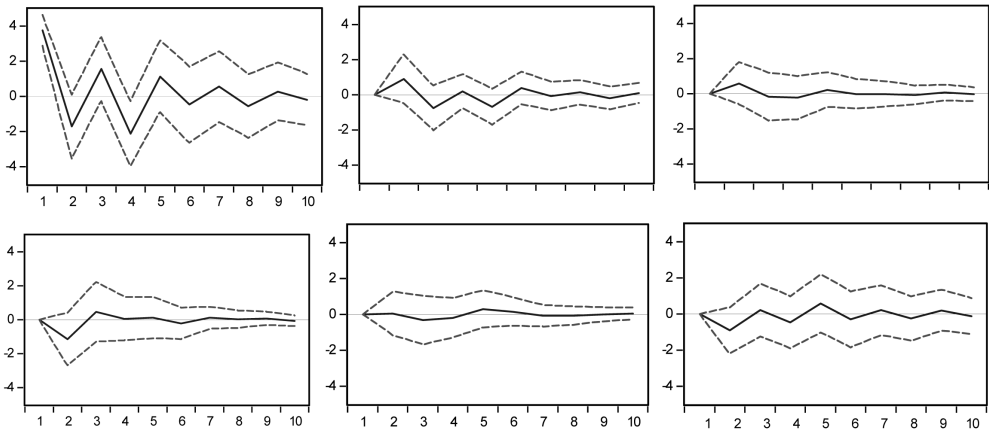

FIG. 6. **Responses of FDI to shocks in FDI, GDP, ER, TRADE, ULC and INFL, the Dutch model**

Variance decomposition analysis. Movements in the sequence of FDI in the Greek model induced by its own shocks and by shocks to other variables are presented in Table 2. The largest part of the movements in the FDI sequence is explained by the shocks to itself. About 9% of the forecast error variance of FDI is explained by shocks to the official exchange rate in the period $t + 1$. Shocks to other variables do not explain significantly the large amount of fluctuations in FDI. A particularly small amount of movements in the FDI sequence is explained by inflation.

TABLE 2. **Variance decomposition of FDI, Greek model**

Period	DFDI	DLGDP	DER	DLULC	DTRADE	INFL
0	100	0	0	0	0	0
1	88.432	0.37247	8.76098	1.38367	0.99208	0.05879
2	86.9315	1.14483	9.30525	1.24602	1.32329	0.04909
3	84.5431	1.26879	9.02556	3.22634	1.76829	0.16797
4	82.1647	1.55605	9.36095	4.07988	2.65965	0.1788
5	81.3185	1.53181	10.0787	4.07725	2.70857	0.28523

Movements in the sequence of FDI in the Irish model, induced by its own shocks and by shocks to other variables, are presented in Table 3. About 91% of the movements in FDI are explained by the exogenous shock to FDI itself in the period $t + 1$. A smaller

part of movements in the FDI sequence caused by an exogenous shock to FDI itself is explained in the further periods. About 4% of the forecast error variance of FDI is explained by the exogenous shock to the exchange rate in the period $t + 1$. Shock to the exchange rate explains about 13% of variance during the further periods. Shock to trade openness and inflation explains about 5% of the forecast error variance in the FDI sequence. Shock to other variables explains an insignificant part of the forecast error variance of FDI.

TABLE 3. **Variance decomposition of FDI, the Irish model**

Period	DFDI	DLGDP	DER	DLULC	DTRADE	INFL
0	100	0	0	0	0	0
1	91.0022	0.38694	4.3311	0.01289	1.47754	2.78932
2	83.2368	0.96544	9.91947	0.2076	1.92004	3.7507
3	75.4225	0.97679	13.3837	0.30353	4.82993	5.08358
4	74.5681	1.03677	12.9393	0.32708	5.90435	5.22447
5	74.383	1.02645	13.0652	0.32283	6.03334	5.16914

Movements in the sequence of FDI in the Dutch model, induced by its own shocks and by shocks to other variables, are presented in Table 4. The FDI forecast error is induced mostly by its own shocks – about 83% in the period $t + 1$. Shock to GDP explains about 6% of the forecast error variance of FDI during the further periods. Shock to the exchange rate explains about 2% of movements in the FDI sequence. Shocks to unit labor costs and inflation explain about 5–6% of the forecast error variance of FDI. The slightest part of movements in the FDI sequence is explained by a shock to trade openness.

TABLE 4. **Variance decomposition of FDI, Dutch model**

Period	DFDI	DLGDP	DER	DLULC	DTRADE	INFL
1	100	0	0	0	0	0
2	83.7998	4.02771	1.71219	6.34592	0.01313	4.10123
3	82.0523	5.80123	1.58747	6.36238	0.46003	3.73662
4	83.8929	4.96196	1.49829	5.29824	0.51816	3.83048
5	81.9324	6.09884	1.55944	4.9637	0.76679	4.67886
6	81.2486	6.47148	1.53346	5.02714	0.83363	4.88567

The variance decomposition analysis revealed that the shock to exchange rate explains a significantly large amount of the forecast error variance of FDI in the Greek model. A negative impact of exchange rate on FDI in Greece was observed in the impulse response graph. Furthermore, results of the Granger causality test revealed that the currency exchange rate caused FDI. Other researches did not determine a significant relationship between the currency exchange rate and FDI. As compared to euro, the Greek

drachma was a very weak and unstable currency, so this factor influenced foreign investors most. Before the euro, introduction investors were able to establish business with low costs. However, the parameter value of the dummy variable *EURO* discloses that the introduction of euro had a significant and positive effect on FDI in Greece. FDI flows from the Eurozone members increased when Greece became a member of the Eurozone. The second dummy variable, which accounts for the financial crisis, is also significant and reveals that the financial crisis had a negative impact on FDI flows.

As with Greece, a large part of the forecast error variance of FDI was explained by a shock to the exchange rate in the Irish model. However, neither the Granger causality test nor the impulse response function showed any significant impact of exchange rate on FDI. Furthermore, quite a significant part of movements in the FDI sequence was explained by trade openness. Ireland distinguished itself by a favorable investment climate. The ease of doing business ranking and the corruption perception index have showed that Ireland is the best country for doing business with the least corrupted private sector. These were important factors in attracting FDI and for a high rate of trade openness. The parameter value of a dummy variable which accounts for the introduction of euro is not statistically significant. The Irish pound was a strong currency as well as euro; therefore, becoming a member of the Eurozone did not have a significant impact on FDI. The parameter value of the dummy variable, which accounts for the financial crisis, is not statistically significant; therefore, the results imply that the financial crisis had no considerable effect on FDI.

Results of variance decomposition in the Dutch model differ from those of other countries. A large part of movements in the FDI sequence were explained by GDP, which was not observed in FDI sequence movements in other models. A steady growth of GDP per capita was observed in the Netherlands. The Netherlands did not have the largest GDP per capita only in 2001–2008 when it was surpassed by Ireland. GDP per capita is an indicator of welfare. It is reasonable that FDI depends on the GDP. When foreign investors are looking for new markets, they will search for countries where customers will afford to purchase more of their products or services. The parameter values of both dummy variables are not statistically significant. Neither the introduction of euro, or financial crisis had a considerable effect on FDI. The Dutch guilder was a strong currency as well as euro therefore the introduction of euro did not have a significant effect on FDI.

Empirical analysis has revealed that FDI in Greece, Ireland and the Netherlands mostly depends on its own past values. Results of the Granger causality test showed that only in Greece the exchange rate impacts FDI. No other significant causalities were determined in any VAR model. The impulse response analysis confirmed findings from the Granger causality test. The significant response of FDI to a shock in the exchange rate was only observed in the Greek model. According to results from impulse response functions, only the exchange rate had a significant and negative impact on FDI in Greece.

Conclusions

Among the forms of capital flows, FDI and portfolio investment are most important. The superiority of these forms is explained by the provision of ownership rights. These forms are more stable as compared with others. FDI distinguishes by the highest rate of return as this form acquires a long-lasting management interest why portfolio investors care for a short-term price as they need a higher liquidity. Thus, they are more vulnerable to liquidity shocks. Investors choose the FDI form depending on the growth strategy – the market or assets expansion, cost reduction, horizontal or vertical integration.

The modern FDI theories analyze relationships between FDI and specific groups of proxy variables like GDP, trade openness, inflation, and labor costs. GDP and trade openness are found to be most common variables in the analysis of FDI factors.

The Greek model analysis confirmed the assumption that the exchange rate has a negative effect on the FDI inflow. The research has also confirmed that being a member of an economic and monetary union has a positive impact on FDI. In Ireland and the Netherlands where exchange rate during the observed period was rather steady, there was no considerable impact on FDI. The introduction of euro did not influence FDI inflow significantly, either. The weaker and more unstable a country's currency is, the more notable negative impact it has on FDI inflow. Membership in an economic and monetary union has a more tangible effect on FDI inflow in countries with a weak and unstable currency in the past.

The investment climate may be determined by assessing the corruption level, the ease of doing business ranking, budget deficit and public debt. Countries which have the better above-mentioned indicators attract more FDI. As a result of the research, it is possible to make a conclusion that the government has to create favorable conditions for business, fight against corruption, control the budget and public debt effectively in order to make its country attractive to foreign investors.

A longer period analysis would provide more accurate data on the FDI factors. Moreover, incorporation of other important factors to the model, such as budget deficit and public debt, would enable to obtain more valuable results. These variables were not included in this analysis because of the lack of data.

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