

## Research Article

### DETERMINANTS OF FDI IN CEE COUNTRIES: A PANEL DATA ANALYSIS

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#### ABSTRACT

The aim of this paper is to identify some of the major economic and institutional determinants of foreign direct investments (FDI) inflows to five CEE countries over the period of 1996-2019 by utilizing panel co integration analysis. The five countries included in this study are Bulgaria, Czech Republic, Hungary, Poland and Romania. The Pedroni and Kao co integration test results show the presence of long-run relationships between FDI and financial developments, economic growth, consumer price index (CPI), trade openness, labour cost, and real effective exchange rate (REER). Using a Fully Modified Ordinary Least Squares (FMOLS) and the vector error correction model (VECM), the real GDP per capita, labour cost, and trade openness have a positive and significant impact on FDI inflows. On the other hand, developing countries don't need better developed financial markets in the FDI-growth nexus. The empirical analysis on CEEs data reveals that the compensation of employees as a share of GDP, used as a proxy for labour cost, has a positive effect on FDI and is statistically significant. This implies that higher wage levels increase FDI inflows into transition economies, one of the positive spillovers of foreign companies in home countries where they operate, by offering higher wages for more qualified labour force who can adopt new and advanced technology easily.

**Keywords:** foreign direct investment, financial development, fully modified ordinary least squares (FMOLS), panel co integration.

#### INTRODUCTION

Foreign direct investment, as additional foreign capital to the domestic capital stock, is considered by the policy-makers to be more conducive to long-run growth than other forms of capital for the developing countries, because the attraction of FDI can stimulate the capital formation and employment, promote exports, can lead to increased labour productivity through the know-how spillover, source of foreign technology, management and marketing skills favoring the technological process and the sustainable developments. Over the last decades, developing countries have implemented policies to offer stimulants and reduced barriers to international investment to attract as much foreign direct investment as possible. Incentive-based competition for FDI has become a wide-spread phenomenon, involving national and sub-national governments in both OECD countries and in developing economies (Oman,1999). To further investigate the impact of the FDI on economic growth, it is important to identify the factors determining entry flows in the recipient economy. A various number of studies have already applied different econometric models in order to identify the most significant determinants of foreign direct investment. More of them have suggested that factors specific to companies, industries, and location variables affect decisions to undertake FDI. There is a long discussion about the determinant factors for the rich countries which would not be the same as those that attract FDI to developing economies. Developing economies have relatively higher inflation, poorer institutions, and lower financial development than the rich economies. Since important FDI inflows go to emerging economies, it is clear that foreign investors are investing in emerging markets due to a different balance of considerations than those investing in more developed countries, high level of development in education, technology infrastructure, and macro stability, in exchange for lower labour costs, larger technological gaps or a protected market. Recent empirical studies showed that financial development can exert a strong impact on economic growth, where economic growth will

attract the FDI inflows. According to Levine (2005), the financial system contributes towards stimulating economic growth through the production of information and allocation of capital, the pooling of the savings, easing exchange, and ameliorating the country's risks. Given the importance of this topic, this study estimated a panel FDI function using Fully Modified Ordinary Least Squares (FMOLS) to identify the determinants of FDI inflows to five countries from CEE during the 1996-2019 period. The results of the econometric model applied show that the market size, labour cost and trade openness play an important role in attracting FDI flows in the developing countries. On the other hand, the developing countries don't need better developed financial markets to entice the inward FDI. The empirical analysis on CEEs data reveals that labour cost has a positive effect on FDI and is statistically significant. This implies that higher wage levels increase FDI inflows into transition economies, one of the positive spillovers of foreign companies in home countries where they operate, by offering higher wages for more qualified labour force who can adopt new and advanced technology easily. Section 2 focuses on a short literature review on the determinants of FDI. Data and methodology are discussed in section 3. Section 4 presents the empirical findings and the last section summarizes the conclusions.

#### LITERATURE REVIEW

Foreign direct investment (FDI) stocks measured as the total level of direct investment at a given point in time have grown strongly in the last decades, reaching the level of 37 trillion USD (or 43% of world GDP) at the end of 2019, of which 11,3 trillion USD (or 61% of GDP) in European Union. Increasing the FDI inflows can improve the economic performance of the host countries by introducing productive technology and advanced techniques, together with the increase of the total level of capital investment in the recipient economy. Hanes and Rand (2004) argue that FDI caused growth via knowledge transfers and new technology, whereas GDP has no long-run impact on the FDI. De mello (1999) also finds a positive impact of FDI on output growth via technological upgrading of the capital stocks and knowledge spillovers, through labour training and skills, management practices, however, depends on the degree of complementary and

substitution between FDI and domestic capital. A vast literature has explored the role of foreign direct investment in the growth process for the host countries, showing a positive relationship between foreign direct investment and economic growth, but it is very important to know, especially for economic policy decedents, the determinants of FDI decisions of multinationals to invest in host economies. Being not completely exogenous, FDI depends on several factors and it is important to know which the relevant determinants of FDI are for the transition countries. It is known that the impact of FDI on the sustainable development of a host economy depends to the economic and political factors of the recipient country, on the level of existing technological capital, however conjointly on the level of human capital, is a strong complementary effect between FDI and human capital in the process of productivity growth (Borenszterin et al., 1998). The recipient country location determinants can influence a firm's location investment choice in order to obtain the highest profitability. De Mello and others (1997) argued that initial conditions of the recipient economy (institutions, trade regime, political risk, policy) play an important role in determining economic performance among transition economies. Dellis et al. (2017) support that higher-quality political institutions and economic structures are important determinants of FDI inflows in case of euro area countries, but also labour costs, the trade openness, the size of the target market, and taxes matter to attract foreign investors. Campos & Kinoshita (2003) also find that the institutions and the agglomeration economies are the most important determinant for the geographical patterns of FDI inflows, but also the resource abundance and low labour costs can be a "blessing". Khachoo & Khan (2012) in their study on the FDI determinants based on a sample of 32 developing countries find that the market size (level of GDP), total reserves and infrastructure are determinants of FDI inflows. Despite its decreasing weight in total production cost, labour cost is still an important factor determining the decisions of investors to choose the location of FDI. Countries, where the labour cost is low, are preferred FDI destinations (Khachoo & Khan, 2012; Campos & Kinoshita, 2003; Bevan & Estrin, 2000). Usually, cheap labour motivates foreign companies to choose developing countries, while the restrictive trade measures, political stability, and stable economic conditions trigger FDI inflows to developed countries. But, the policymakers must ensure through the strengthened international policy co-ordination that competition to attract more FDI inflows does not lower the environment, and core labour standards, and works in an upward direction (Oman, 1999). Foreign investors should be concerned not solely with the total cost of the labour force, however with the quality of the labor force existing in the host country because a more educated and talent labour force can adopt new technology easily and increase the skill acquisition with a reduced cost. Beyond that, there is some evidence that one of the effects of foreign companies' presence is to increase the average level of wages, in their intention to hire more qualified and educated labour force by offering higher wages than local companies (Lipsey, 2002). Nevertheless, there may be worries that FDI may lead to a phenomenon of creative destruction (Jude, 2015) on the labour market by the introduction of labour-saving techniques, which lead to a negative externality in employment within the short run, however with positive effect within the long run, as foreign companies create linkages with local companies and their productivity. Due to the strict barriers imposed to foreign investors, economies from Central and Eastern Europe couldn't attract foreign capital until 90's. After the restrictions were reduced and the government offered the opportunities to transfer the state monopolies to private ownership, CEECs became attractive to strategic investors. According to Mistura & Roulet (2019), FDI restrictions together with foreign investment screening policies have had a strong negative impact on FDI inflows, being very important that governments continuously benchmark their investment regime against peer economies on a net benefit basis.

Foreign investors are attracted by the transition countries where the trade openness is strong and with fewer restrictions on FDI (Campos & Kinoshita, 2003). The market size and the growth potential have been the important determinants of FDI inflows in CEECs and not the labour costs (Benacek et al., 2000). Macroeconomic development and political stability have been also very important to foreign investors. Bevan & Estrin (2000) suggest that the country risk, unit labour costs, market size, and distance between foreign investors and recipients, as a proxy for the transaction costs of undertaking operations, are the main determinants of FDI inflows in CEE transition economies. Also, political announcements regarding the process in EU accession can directly impact the level of FDI, thereby improving economic growth but not through country credit ratings. In a study of the transition countries of CEE, Neuhaus (2006) finds that bigger market size, a low level of factor inputs costs (costs for energy, labour force, and natural resources), stable fiscal balance, and low inflation, as well as a stable political and institutional environment with a low level of corruption, and higher political freedom, are all necessary to attract large FDI inflows. In a study of the macroeconomic influences on inward FDI in Norway, Boateng et al. (2015) confirm the significant positive impact of the real GDP, exchange rate, and trade openness on FDI inflows while inflation, unemployment, money supply, and interest rate produced significant negative results, using co-integrating regressions with FMOLS and VECM. Jayasekara (2014) find that economic growth, inflation, lending interest rate, labour force, infrastructure, exchange rate stability, and corporate income tax are the most significant determinant of FDI flows in Sir Lanka. Ramirez (2019) using Dining's OLI model in order to identify the major economic and institutional determinants of FDI in nine countries of Latin America, finds that the market size, the ratio of government expenditures on education to GDP, the credit provided by the banking sector, and the level of economic freedom have a positive and statistically significant effect on FDI inflows. By contrast, a real depreciation of the national currency and the public investment spending has a negative effect. Rachdi et al. (2016) argue that GDP growth and trade openness have a positive effect on FDI while inflation and real effective exchange rate have a negative and statistically significant effect. The development of the host financial sector is crucial for the magnitude of FDI and for higher growth rates, financial markets allowing the backward linkages between domestic companies and foreign investors to turn into positive FDI spillovers (Alfaro et al., 2009). Levine (1997) underlines some basic functions of the financial sector, namely facilitating the risk amelioration, resource allocation, monitoring the management teams in the best interest of the owners, mobilizing the saving by pooling the capital, and facilitating transactions through different financial instruments. Nor & Bahri (2016) have pointed out that the higher level of financial developments of the host country will contribute to absorbing the positive spillovers of FDI in the long run. In a sample of emerging and developing economies and a breakdown into primary, secondary, and tertiary sector investments, Walsh & Yu (2010), find that labor market flexibility and financial systems are more important for emerging economies than advanced ones, while a stronger exchange rate and low inflation will lead to more tertiary FDI flows into advanced economies. Kugler & Neusser (1998) conclude that between technical progress, as measured by the evolution of the manufacturing total factor productivity, and financial development is a long-run relationship, in consistency with Schumpeter's conjecture that views the incremental flows in the financial sector as essential in economic development. Using a dynamic panel threshold model, Samargandietal. (2015) find the existence of an inverted U-shaped relationship between economic growth and financial development, too much finance might having a negative influence on growth in the case of middle-income countries. Some recent studies of Bahri et al. (2018) reveal that financial development has a nonlinear relationship

with FDI in the long-run, contributing to FDI inflows when financial development passes a threshold level at 70 points. Countries need to have financial strength in order to attract foreign investors. Solomon (2011) concludes that the level of financial development and the quality of economic policy insignificantly affect the relationship between FDI and growth. By contrast, Law & Singh (2013), find that more finance is not always good for economic growth if the financial development exceeds the threshold, and an "optimal" level and efficient channeling of financial resources are more important for growth. In case of FDI and trade, most studies argued that there is a positive relationship between these two variables (Blomstrom et al. 1988, Kravis & Lipsey 1988). In an open economy, FDI has reinforcing effects on GDP directly, and indirectly through exports, by the interaction between economic growth and exports (Hsiao, 2006), but also economic growth has beneficial effects on trade (Rodrigues & Rodrik, 2000). Levine & Renelt (1992) suggest an important two-link chain between the ratio of trade to GDP and economic growth through the ratio of investment to GDP and the positive relationship between international trade and growth may be based on a higher physical share of investment in GDP and not on the improved resource allocation, which is opposite to the theoretical opinions.

## METHODOLOGY

### Data

This research is based on the annual data for five countries of Central and Eastern Europe (Bulgaria, Czech Republic, Poland, Hungary, and Romania) over the period from 1996 to 2019 (subject to data availability). The five Central and Eastern European economies have similarities in culture and geographical proximity, their fast economic growth during the last 10 years, and many researches confirm that net inflows of foreign direct investment were the engine of economic growth in Central and Eastern Europe. According to Blonigen et al. (2007), the spatial interdependence and the traditional determinants of FDI inflows are quite sensitive to the sample of countries examined in trying to argue different motivations for attracting FDI. The data for the inward FDI flows (% GDP) and trade openness is provided by UNCTAD, while the data for the rest of the variables are taken from the World Bank dataset, Euro stat, IMF. In terms of the variables, real GDP per capita is in constant US dollar, FDI, OPEN, and FINDEV are as a percentage share of GDP. LABOUR represents the compensation of employees as a percentage of GDP, as a proxy for labour cost of each developing economies, and is expected to have a negative impact on FDI flows, foreign investors been attracted by the cheap labour of the host economy. Real GDP per capita is the proxy for the host countries' market scope and size and using GDP per capita instead of nominal GDP in US dollar or PPP terms could produce less robust results, as the dependent variable is the ratio of inwards FDI flows to nominal GDP. The level of economic growth is one of the factors that attract FDI, the richest countries generally receiving more FDI and the level of financial development is higher in those countries. Following the studies undertaken by Alfaro et al. (2002), Law and Singh (2014), Bahri et al. (2018), for financial development we used domestic credit to private sector as a percentage share of GDP. Trade openness is measured in terms of the ratio of exports and imports of goods and services to GDP and is a proxy for the countries' economic openness, having a positive impact on the FDI. The ratio of the sum of exports and imports to GDP is the most used proxy for trade openness due to the data availability for all countries. Additionally, we include inflation and we used the Consumer price index 2010 as a proxy for the inflation rate. We choose also to consider inflation because higher volatility of inflation has a detrimental effect on the economy reflecting a higher degree of macroeconomic instability. The model also includes RER

as the real effective exchange rate, as a proxy for the evolution of the links between monetary policy and international competitiveness. All data are converted into natural logarithms.

### Model

Taking into account some results presented in the literature, we applied a panel data technique to evaluate the effects of the financial development (FINDEV), gross domestic product per capita (GDP), inflation (CPI), labour cost (LABOUR), trade openness (OPEN), real effective exchange rate (REER) on foreign direct investment (FDI) in five countries of CEE. Panel data has more advantages than cross-section or pure time-series data, such as controlling individual heterogeneity or identifying and measuring the effects that are not detectable in time-series or cross-country estimations. In the case of cross-section and time-series data, the correlation between the error term, and the repressors' exists and as a result, it could obtain biased results. According to Hsiao (2007), in panel data analysis, the unobservable growth determinants that are country-specific, can be acknowledged and included in the estimation procedure. Besides, the country-specific determinants of FDI inflows may provide further insight into ulterior growth determinants that are undetectable in the time-series data (de Mello, 1999).

To identify the factors that determine the FDI inflows in a panel, the following empirical formulation (1), (2) are modeled in the following equations:

$$FDI_{it} = f(FINDEV_{it}, GDP_{it}, CPI_{it}, OPEN_{it}, LABOUR_{it}, REER_{it}, W_i) \quad (1)$$

$$FDI_{it} = \alpha_0 + \alpha_1 FINDEV_{it} + \alpha_2 GDP_{it} + \alpha_3 CPI_{it} + \alpha_4 OPEN_{it} + \alpha_5 LABOUR_{it} + \alpha_6 REER_{it} + W_i + u_{it} \quad (2)$$

From equation (2), after taking the natural logs, an estimable function is specified as follows:

$$\ln FDI_{it} = \alpha_1 \ln FINDEV_{it} + \alpha_2 \ln GDP_{it} + \alpha_3 \ln CPI_{it} + \alpha_4 \ln OPEN_{it} + \alpha_5 \ln LABOUR_{it} + \alpha_6 \ln REER_{it} + u_{it} \quad (3)$$

### Panel unit roots

Using panel data that tend to be non-stationary, it is very important to test for the presence of unit roots and to determine the order of integration. In this paper, we performed three different panel unit root tests, proposed by the Augmented Dickey-Fuller (ADF), Levin, Lin and Chu (LLC) and Im, Pesaran and Shin (IPS). Although these tests are theoretically named "panel unit root", they are only multiple-series unit root tests applied to panel structures, where the presence of cross-sections produces "multiple series" out of one series. For each variable used in the econometric model, all three tests aim to determine the order of integration or the number of the difference applied in order to obtain the stationary variable.

### Panel co integration tests, FMOLS and DOLS

The panel co integration test proposed by Pedroni takes their starting point by the following regression:

$$y_{1it} = \mu_i + \beta_i x_{2it} + u_{it}, \quad (4)$$

where the scalar  $y_{1it}$  and  $x_{2it}$  are country specific variables,  $i=1, \dots, N$  and  $t=1, \dots, T$ . Under the null hypothesis of no co integration among variables, the residuals  $u_{i,t}$  must be  $I(1)$ . If the null hypothesis is rejected then we conclude that the variables are co integrated for at least one country from the panel. The co integration is estimated individually for each  $i$  and the residuals are then tested for unit roots where the parameter of interest is  $\gamma_i$  in the following regression:

$$\hat{u}_{i,t} = \gamma_j + \gamma_i \hat{u}_{i,t-1} + \sum_{j=1}^p \theta_{i,j} \Delta \hat{u}_{i,t-j} + \varepsilon_{i,t}, \tag{5}$$

The Pedroni test specifies seven statistics, four of them are panel statistics, capturing the within-dimension effects, and three of them are group statistics, capturing the between-dimension effects by pooling the AR coefficients across cross-sections. We also use Kao test for robustness. The Kao co integration test follows the same approach used in the Pedroni test but specifies cross-section specific intercepts and homogenous coefficients, while the Pedroni test specifies cross-section specific intercepts and heterogeneous intercepts. After the results of the co integration test, if there is evidence of a long-term relationship between the examined variables, we apply the panel Fully Modified Ordinary Least Squares (FMOLS) techniques to equation (2) above. The panel FMOLS estimator for the coefficient  $\beta$  for country is represented as:

$$\hat{\beta}_i^* = \sum_{t=1}^T (X_i' X_i)^{-1} \sum_{t=1}^T (X_i' y_i^* - T\delta), \tag{6}$$

where T is the number of periods,  $y_i^*$  is the transformed variable and  $\delta$  is the parameter adjusted for serial correlation. According to Pedroni (2000), the FMOLS estimators are extremely accurate, allowing for cross-sectional heterogeneity, endogeneity, and serial correlation dynamics. In this paper, we applied the pooled panel fully modified OLS (FMOLS) technique, where the pooled estimators are based on the within dimension of the panel. Since the co integration analysis does not confirm the direction of causality, so we have to use the panel Granger causality analysis to determine the long-run and the short-run relationships among the seven variables in the system. The panel Granger causality test with a dynamic error correction is specified as follows:

$$\begin{aligned} \Delta LFDI_{it} = & c_{1i} + \sum_{j=1}^p \alpha_{1ij} \Delta LFDI_{it-j} + \sum_{j=1}^p \beta_{1ij} \Delta LFINDEV_{it-j} + \\ & \sum_{j=1}^q \gamma_{1ij} \Delta LGDP_{it-j} + \sum_{j=1}^q \delta_{1ij} \Delta LCPI_{it-j} + \\ & \sum_{j=1}^q \theta_{1ij} \Delta LOPEN_{it-j} + \sum_{j=1}^q \vartheta_{1ij} \Delta LLABOR_{it-j} + \\ & \sum_{j=1}^q \mu_{1ij} \Delta LREER_{it-j} + \psi_{1i} \varepsilon_{it-1} + \\ & u_{1it} \end{aligned} \tag{7}$$

$$\begin{aligned} \Delta LFINDEV_{it} = & c_{2i} + \sum_{j=1}^p \alpha_{2ij} \Delta LFINDEV_{it-j} + \\ & \sum_{j=1}^q \beta_{2ij} \Delta LFDI_{it-j} + \sum_{j=1}^q \gamma_{2ij} \Delta LGDP_{it-j} + \\ & \sum_{j=1}^q \delta_{2ij} \Delta LCPI_{it-j} + \sum_{j=1}^q \theta_{2ij} \Delta LOPEN_{it-j} + \\ & \sum_{j=1}^q \vartheta_{2ij} \Delta LLABOR_{it-j} + \sum_{j=1}^q \mu_{2ij} \Delta LREER_{it-j} + \\ & \psi_{2i} \varepsilon_{it-1} + u_{2it} \end{aligned} \tag{8}$$

$$\begin{aligned} \Delta LGDP_{it} = & c_{3i} + \sum_{j=1}^p \alpha_{3ij} \Delta LGDP_{it-j} \\ & + \sum_{j=1}^p \beta_{3ij} \Delta LFINDEV_{it-j} \\ & + \sum_{j=1}^q \gamma_{3ij} \Delta LFDI_{it-j} + \sum_{j=1}^q \delta_{3ij} \Delta LCPI_{it-j} \\ & + \sum_{j=1}^q \theta_{3ij} \Delta LOPEN_{it-j} \\ & + \sum_{j=1}^q \vartheta_{3ij} \Delta LLABOR_{it-j} \\ & + \sum_{j=1}^q \mu_{3ij} \Delta LREER_{it-j} + \psi_{3i} \varepsilon_{it-j} \\ & + u_{3it} \end{aligned} \tag{9}$$

$$\begin{aligned} \Delta LCPI_{it} = & c_{4i} + \sum_{j=1}^p \alpha_{4ij} \Delta LCPI_{it-j} + \sum_{j=1}^p \beta_{4ij} \Delta LFINDEV_{it-j} + \\ & \sum_{j=1}^q \gamma_{4ij} \Delta LFDI_{it-j} + \sum_{j=1}^q \delta_{4ij} \Delta LGDP_{it-j} + \\ & \sum_{j=1}^q \theta_{4ij} \Delta LOPEN_{it-j} + \sum_{j=1}^q \vartheta_{4ij} \Delta LLABOR_{it-j} + \\ & \sum_{j=1}^q \mu_{4ij} \Delta LREER_{it-j} + \psi_{4i} \varepsilon_{it-j} + \\ & u_{4it} \end{aligned} \tag{10}$$

$$\begin{aligned} \Delta LOPEN_{it} = & c_{5i} + \sum_{j=1}^p \alpha_{5ij} \Delta LOPEN_{it-j} + \sum_{j=1}^p \beta_{5ij} \Delta LFINDEV_{it-j} + \\ & \sum_{j=1}^q \gamma_{5ij} \Delta LFDI_{it-j} + \sum_{j=1}^q \delta_{5ij} \Delta LGDP_{it-j} + \\ & \sum_{j=1}^q \theta_{5ij} \Delta LCPI_{it-j} + \sum_{j=1}^q \vartheta_{5ij} \Delta LLABOR_{it-j} + \\ & \sum_{j=1}^q \mu_{5ij} \Delta LREER_{it-j} + \psi_{5i} \varepsilon_{it-j} + u_{5it} \end{aligned} \tag{11}$$

$$\begin{aligned} \Delta LLABOR_{it} = & c_{6i} + \sum_{j=1}^p \alpha_{6ij} \Delta LLABOR_{it-j} + \sum_{j=1}^p \beta_{6ij} \Delta LFINDEV_{it-j} + \\ & \sum_{j=1}^q \gamma_{6ij} \Delta LFDI_{it-j} + \sum_{j=1}^q \delta_{6ij} \Delta LGDP_{it-j} + \\ & \sum_{j=1}^q \theta_{6ij} \Delta LCPI_{it-j} + \sum_{j=1}^q \vartheta_{6ij} \Delta LOPEN_{it-j} + \\ & \sum_{j=1}^q \mu_{6ij} \Delta LREER_{it-j} + \psi_{6i} \varepsilon_{it-1} + u_{6it} \end{aligned} \tag{12}$$

$$\begin{aligned} \Delta LREER_{it} = & c_{7i} + \sum_{j=1}^p \alpha_{7ij} \Delta LREER_{it-j} + \sum_{j=1}^p \beta_{7ij} \Delta LFINDEV_{it-j} + \\ & \sum_{j=1}^q \gamma_{7ij} \Delta LFDI_{it-j} + \sum_{j=1}^q \delta_{7ij} \Delta LGDP_{it-j} + \\ & \sum_{j=1}^q \theta_{7ij} \Delta LCPI_{it-j} + \sum_{j=1}^q \vartheta_{7ij} \Delta LOPEN_{it-j} + \\ & \sum_{j=1}^q \mu_{7ij} \Delta LLABOR_{it-j} + \psi_{7i} \varepsilon_{it-1} + u_{7it} \end{aligned} \tag{13}$$

The coefficients  $\alpha$ ,  $\beta$ ,  $\delta$ ,  $\theta$ ,  $\vartheta$  and  $\mu$  are the short-run dynamic coefficients of the model's convergence to long-run equilibrium and  $\psi$  is the speed of adjustment.

## RESULTS

### Descriptive statistics and panel unit root test

The econometric technique necessitates transforming the values of all real variables into their logarithmic values. Thus, the fluctuations of the four variables are considerably diminished. Table 1 provides a summary of the descriptive statistics of variables used (LFDI, LFINDEV, LGDP, LCPI, LOPEN, LLABOUR, LREER) for panel data during 1996-2019. For every variable, we have 120 observations, because we have data series of 24 years for 5 countries selected from CEE. Mean values of all variables are positive where the mean value for LGDP is the highest at 9.2188 while the lowest mean value is LFDI at 1.4793. Also, LFDI has the highest gap between maximum and minimum compared with the other variables, as well as the standard deviation which is far apart from others. That could imply that LFDI has some upwards outliers. The median for LGDP and LFDI is 9.2% and 1.3%, respectively. The results of the Jarque-Bera test for normality test show that only LGDP and LOPEN are normally distributed. We execute a unit root stationary test on panel data to examine the order of integration of each series and then use the co integration test, in order to test the causality among the seven variables in this research. If these variables (i.e., FDI, financial development, RGDP, trade openness, inflation, labour cost, and real effective exchange rate) are co integrated, we must examine the short and the long-run Granger causality using vector error correction models (VECM), instead of a VAR model. Several tests will be performed, such as Levin and Lin (LLC) unit root test, Im-Pesaran-Shin (IPS) test, and the Augmented Dickey-Fuller (ADF) test to determine the order of integration of these seven variables. For the null hypothesis (H0), the panel data is stationary if the p\_value is less than 10% and its alternative hypothesis is no stationary. According to LLC test, IPS test, and ADF test, at the 1% level of significance, the LFDI, LFINDEV, LCPI, LLABOUR, and LREER are stationary and are

integrated as zero, I(0). The real GDP and the trade openness are not stationary and therefore, we have proceeded to the differentiation of order 1 of these series and the results show that these series are stationary of 1 order, I(1), meaning that they do not have a unit root, as shown in Table 2.

statistics that reject the null hypothesis of no co integration among the variables at 1%, 5%, and 10% significance levels. Therefore, the evidence from these Pedroni panel tests supports that the variables are co integrated and the presence of a long-term equilibrium relationship among foreign direct investment, financial development,

**Table 1. Descriptive statistics**

Variables	LFDI	LFINDEV	LGDP	LCPI	LOPEN	LLABOUR	LREER
Mean	1.48	3.50	9.22	4.34	4.63	2.23	4.48
Median	1.33	3.62	9.20	4.48	4.68	2.25	4.54
Maximum	4.00	4.23	10.08	4.82	5.13	2.55	4.72
Minimum	-0.65	1.96	8.24	1.28	3.91	1.68	3.78
Std. Dev.	0.82	0.56	0.47	0.58	0.32	0.16	0.16
Skewness	0.68	-0.99	-0.17	-3.31	-0.39	-0.69	-1.45
Kurtosis	4.27	3.19	2.16	16.26	2.14	3.74	5.41
Jarque-Bera	16.38	18.98	3.87	1043.95	6.51	11.58	67.35
Probability	.00	.00	.14	.00	.04	.002	0.00

**Table 2. Panel Unit Roots tests**

Variables	LLC	IPS	ADF	Variables	LLC	IPS	ADF
LGDP	-0.38	2.67	1.53	D_LGDP	-5.43***	-5.49***	47.26***
LFDI	-3.28***	-3.25***	31.90***	D_LFDI	-7.19***	-8.77***	76.09***
LFINDEV	-5.50***	-3.14***	29.99***	D_LFINDEV	-12.09***	-9.24***	92.55***
LCPI	-7.49***	-6.43***	57.77***	D_LCPI	-43.24***	-38.10***	318.11***
LOPEN	-1.56*	-1.14	15.61	D_LOPEN	-7.08***	-6.02***	52.64***
LLABOUR	-3.10***	-3.49***	35.40***	D_LLABOUR	-6.279***	-5.767***	50.43***
LREER	-2.64**	2.57*	23.21*	D_LREER	-6.17***	-6.08***	53.32***

Note: The symbol \*\*\*, \*\*, \* denotes significance at 1, 5 or 10% level. Individual intercept.

**Table 3. Pedroni (2004) panel co integration results**

Model : LFDI, LFINDEV, LGDP, LCPI, LOPEN, LLABOUR, LREER	
Statistic	Weighted Statistic
Within dimension	
Panel $v$ -2.04-3.02	
Panel $\beta$ 1.641.49	
Panel PP-3.58***-6.50***	
Panel ADF -3.32***-4.92***	
Between dimension	
Group $\beta$ 2.47	
Group PP-3.58***	
Group ADF -2.31*	

Note:(i) Trend assumption: Deterministic intercept and trend;  
 (ii) Automatic lag length selection based on SIC with lags from 1 to 3;  
 (iii) The symbol \*\*\*, \*\*, \* denotes significance at 1, 5 or 10% level.

**Panel Co integration Tests**

Now if we showed that the series is stationary of 1 order, I(1), we can perform several panel co integration tests such as Pedroni (1999,2004) and Kao, in order to examine the long-run relationships among these variables. The Pedroni and Kao panel co integration tests are based on the Engle-Granger two-step (residual-based) tests. If there are at least four of seven test statistics in the Pedroni test with values of probability under the selected significance level, the null hypothesis of no co integration relationship can be rejected. Maximum lag length in the equations is automatically selected, using Schwarz Info Criterion. We applied Newey-west automatic bandwidth selection and Bartlet kernel. Table 3 presents the results of the Pedroni panel co integration tests and there are four different

trade openness, inflation, labour force, and real effective exchange rate in CEE countries.

The Kao co integration test presents the same results for all variables as those obtained in Pedroni panel test. Table 4 exhibits the results of the Kao panel co integration test under the assumption of no deterministic trend. For a 1% level of significance, there is a valid co integration relationship between the variables, implying the presence of a long-run relationship among the regressors.

Table 4. Results from Kao Panel Co integration Test

Model: ADFt-statisticProb.
LFDI, LFINDEV, LGDP, LCPI, LOPEN, LLABOUR, LREER-2.39***.008

Note: (i)The symbols \*, \*\* and \*\*\* denote significance at the 10, 5 and 1% levels and k is the number of regressors. (ii)Trend assumption: no deterministic trend

**Panel co integration regression**

In order to obtain a clear image of the co integration relationships between FDI and other macroeconomic variables in developing countries from CEE, we employed in this study the pooled Fully Modified OLS (FMOLS) method and the results are presented in Table 5. In pooled FMOLS estimation coefficient of covariance is computed using the sandwich method. The within estimation eliminates the persistent differences between countries over the entire period, allowing to take into account the heterogeneity of individuals in their temporal dimension. Table 5 reports that real GDP per capita, trade openness, and labour cost having positive and significant impacts on FDI inflows at 1% and 10% significant level in FMOLS estimation. As expected, the real GDP per capita is highly significant in FMOLS estimation, meaning that a 1% increase in the real GDP increases the share of FDI inflows by 4.22% in CEEs, *ceteris paribus*. This result is consistent with the finding of Bevan & Estrin (2000), Neuhaus (2006), Boateng et al. (2015), Ramirez (2019), who also suggested that economic growth tends to attract further foreign investors who prefer market-seeking in order to locate their companies to the recipient countries. Furthermore, the foreign investment decisions depend not only the existing market potential of the host country but also on the expected size and potential growth of the market in the long-run. Our results show that the degree of a recipient country's trade openness is significant positive to FDI inflows in FMOLS estimation, indicating that the larger the weight of imports and export in the GDP of the host country, the more it seems able to absorb FDI flows. In newly opening transition economies, future foreign investors may become more informed of existing local conditions from trade in goods and services and more encouraged to invest in the host country they know better (Campos & Kinoshito, 2003). This finding is in line with the existing results obtained by Dellis (2017), Boateng (2015), Liu et al. (2001). The labour cost is positive and significant at a 10% level, suggesting that a 1% increase in labour cost increases the share of FDI inflows in GDP by 0.95%, *ceteris paribus*. Further, the variable labour cost affects positively the foreign direct investment inflows into developing countries, also supported by the findings reported by Lipsey (2002). Foreign investors are concerned about labour cost when the wage levels are already high, such as in the developed countries (the compensation of employees was 1138 billion EURO for Euro Area in 2019) and, when they are looking to reduce the cost with labor force by relocating production activity to the developing countries where resources are already at a lower cost (250 billion EURO for five countries selected in this study from CEE in 2019). With regard to the real exchange rate, the results indicate no significant impact on FDI in FMOLS estimation. The price for goods and services is not significantly related to FDI in CEE countries, in contradiction to the finding by Bahri et al. (2018). Turning to the domestic credit to private sector variable as a proxy for the financial development, it can be seen that it has no impact on FDI inflows, meaning that the effect of FDI on economic growth does not depend on the level of financial development of the host country. These findings in this paper are in line with other surveyed studies (Jude, 2017; Solomon, 2011). Particularly for CEEs, it may be concluded that the inward FDI flows are explained mainly by the market size, trade openness, and labour cost.

**Table 5. Panel long-run estimates**

LFDI is the dependent variable	
Variables	FMOLS

LFINDEV	0.13
LGDP	4.22***
LOPEN	1.63***
LCPI	0.11
LLABOUR	0.95*
LREER	0.21
R-squared	0.62
Jarque-Bera	2.45

Notes: (i) Panel method using pooled estimation; (ii) Bartlett kernel and Newey-West fixed bandwidth; (iii) The symbol \*\*\*, \*\*, \* denotes significance at 1, 5 or 10% level.

**Granger causality**

Because all the variables are co integrated, we proceed to analyze the short-run Granger causality in the ECM framework based on Equation (3). The results of PVECM Granger causalities are shown in Table 5. In the short-run, the F-statistics on the explanatory variables suggest that there is a bi-directional Granger causality among real GDP and labour cost in CEE countries. This implies that an increase in the quality of human capital leads to economic development, labour cost being an important factor in terms of economic growth. Results of Granger causality reported in Table 6 show bidirectional causal links between real GDP and CPI, among financial development and labour cost, between CPI and REER and among CPI and FDI inflows. There is no significant Granger causality from FDI to financial development and economic growth in the short-run in developing countries. Also, there is a one-way causal link running from trade openness to economic growth or from economic growth to exports and imports. In the long-run term, if the ECT is negative and statistically significant, we can discuss the long-run causality. Therefore, in the long-run, we acknowledge bidirectional causality between economic growth and inflation, as well as a bidirectional causal relationship between FDI and inflation, and between real exchange rate and inflation. Also, in the long term, we identify a one-way causal link from financial development to economic development and to labour cost and, a one-way unidirectional causal link running from labor cost to financial development. As well as, we acknowledge a one-way causal relationship from the market size, inflation, trade openness, and labour to FDI.

**Table 6. Results panel vector error-correction model Granger causalities**

Dependent variable	Independent variables						
	ΔLFDI	ΔLFINDEV	ΔLGDP	ΔLCPI	ΔLOPEN	ΔLLABOUR	ΔLREER
ΔLFDI	-	0.78	1.89	5.63*	3.32	1.08	1.20
ΔLFINDEV	0.39	-	9.50**	3.16	0.37	4.65*	4.18
ΔLGDP	7.42**	1.73	-	16.40***	3.95	10.92***	0.87
ΔLCPI	10.01***	2.55	7.11**	-	7.38**	2.68	10.67**
ΔLOPEN	8.05**	1.65	19.94***	3.94	-	0.22	9.62***
ΔLLABOUR	4.62*	11.41***	7.19**	2.89	8.72**	-	8.22**
ΔLREER	0.22	8.63**	0.95	9.84**	1.08	2.32	-
ECT	-	0.008	-	-	-	-0.015***	0.017**
	0.18**		0.01**	0.009	0.03***		

Note: The symbols \*, \*\* and \*\*\* denote 10, 5 and 1% significance level. The number of lags we use 2.



## CONCLUSIONS

The object of this paper was to develop an empirical econometric framework to identify the potential determinants of FDI inflows in transition economies from Central and Eastern Europe. Using panel data for five Central and Eastern European countries for the period 1996-2019, the current study examined the relationship between foreign direct investment and financial development, economic growth, inflation, labour cost, trade openness, and the real effective exchange rate. The quantitative outcomes of FMOLS confirmed that market size, trade openness, and labour cost are the main determinants of FDI in CEEs. On the other hand, developing countries don't need better developed financial markets in FDI-growth nexus. The most important implication of those econometric results of this research is to use the compensation of employees as the proxy for labour cost. The empirical analysis on CEEs data reveals that the compensation of employees as a share of GDP, used as a proxy for labour cost, has a positive effect on FDI and is statistically significant. This implies that higher wage levels increase FDI inflows into transition economies, one of the positive spillovers of foreign companies in home countries where they operate, by offering higher wages for more qualified labour force who can adopt new and advanced technology easily. Foreign multinationals are concerned about labour cost when the home country wage levels are already high, such as in the developed countries, and when they are looking to reduce the cost with the labour force by relocating production activity to the developing countries where human resources are already at a lower cost. Continuous increase of FDI stocks as percentage of GDP in Bulgaria, Czech Republic, Hungary, Poland, and Romania in the last two years indicated that these countries had maintained their attractiveness for foreign investors. Furthermore, the panel vector error-correction model Granger causalities provided evidence for a short-run bidirectional causal relationship between the real GDP and CPI, among financial development and labour cost, between CPI, and REER and among CPI and FDI inflows. Also, the long-run two-way causal links between FDI and inflation, among economic growth and inflation, and between the real exchange rate and inflation were established. Hence, in terms of policy recommendations, the policymakers must implement some reforms to improve the market size, trade openness, and labour cost to increase inward FDI into CEEs. Various incentives must be offered to foreign investors, like governmental non-reimbursable grants for the asset purchases, incentives in the form of interest reductions to investors for investment loans or state guarantees, or incentives for the new workplaces created in the host country.

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