

Does Foreign Direct Investment and Trade Openness Support Economic Development? Evidence from Four European Countries

Evans Yeboah*

Abstract: The European Union (EU) as a political and economic union has provided many benefits to its member states through the single market and common tariffs that serves as a platform for internal trade and international trade with third-world countries. The study aimed to investigate the effect of foreign direct investment (FDI) and trade openness on economic development in four selected countries including the Czech Republic, Estonia, Lithuania, and Slovakia using panel data from 1995 to 2021. The data was obtained from the World Bank and analyzed through econometric methods such as pooled model, fixed effect model, random effect model, and the dynamic panel model. The between transformation results using the pooled ordinary least squares indicated that the Czech Republic had the highest intercept coefficient, followed by Slovakia, Lithuania, and Estonia, respectively. The panel specification test discovered that the pooled model was inadequate, and the random effect model is the most appropriate to be used. The results from the random and fixed effects models displayed that FDI and trade openness have a positive impact on economic growth in these countries. Additionally, the dynamic panel outcome proved a positive effect of FDI and trade openness. The study recommends that governments in these countries improve their business environment to attract more FDI and trade relations with other countries.

Keywords: FDI; GDP; European Union; trade openness; single market.

JEL classification: F14; O11; O40; E22.

* Department of Business Economics, Faculty of Business and Economics, Mendel University in Brno, Czech Republic; e-mail: xyeboah1@mendelu.cz.

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1. INTRODUCTION

Foreign direct investment and trade openness have sparked more interest from economists and governments as many studies have shown that they are very significant to economic growth. Trade opening up has a positive impact on FDI inflows (Abimbola, 2011; Liargovas & Skandalis, 2012; Zaman *et al.*, 2018). Foreign investment benefits both the host country and the country from which it originated by promoting economic expansion, creation of jobs, and integration into global value chain. Most nations aim to improve the friendliness of their business environment through sound domestic policies and international agreements to attract more investors. However, because domestic resources are frequently insufficient to meet all the needs of an economy, countries must rely on FDI to achieve their objectives of rapid economic expansion and a stable economic system (Chen & Zhu, 2004).

Although the precise linkages between growth, trade, and FDI are still far from being well defined but they are regarded as crucial in economic development, particularly for developing nations (Kim *et al.*, 2013). Consequently, over the years developed economies turned to have lower tariffs to ensure that their economies benefit from FDI and international trade. International trade and FDI allow the host nation to increase investment levels above the level of domestic savings. Trade between nations is a major factor in both industrialization and technological advancement. Technology transfer is important to developed nations as they know the importance of infrastructure regarding a liberalized market and a stable economy (Makki & Somwaru, 2004; Ellahi & Khan, 2011). FDI and foreign trade play a role in transferring modern technology from developed economies to developing countries (Mankiw *et al.*, 1992; Feenstra & Hanson, 1997).

Conversely, it has been indicated that the quantitative impacts of FDI on the global employment are more restrained and significant in host developing countries than in most developed countries, particularly in production areas (UNCTAD, 1999). In the European Union (EU) countries investment and trade are focused mostly on renewable projects that have long-term benefits to the environment. Because of the long-term effects of finance on renewable energy usage initiatives and the advantages of sustainable development in European countries, understanding how the financial sector affects people's propensity to use renewable energy is crucial (Wang *et al.*, 2023). The EU is the leading provider and recipient of foreign investment in the world. According to the European Commission as of 2019, investors residing in the EU possessed shares of foreign direct investment companies in the rest of the globe worth €8,990 billion. Additionally, at the end of 2019, FDI equities held by investors from outside the EU was €7,138 billion. Investment and trade policies in the EU may be different from other parts of the world as the Union controlled foreign investment policies on behalf of members starting from 2009. One of the main objectives of the EU investment policy is to stir up an investment that promotes sustainable development, respect for human rights, and high labor and environmental standards.

The EU commission indicated that the EU wants to make sure that the Energy Charter Treaty (ECT) reflects contemporary investment standards, such as those followed by the EU's revision of its investment protection policy, and that it has greater measures for sustainable development and supports the advancement of human rights and global labor standards. The outline of this study is categorized according to the following: Section 2 is a literature review, Section 3 materials and method, Section 4 results and discussion, and Section 5 is the conclusion.

Objective of the study

The study investigates the effect of FDI inflow, and trade openness in four EU economies. This study is significant because the results will contribute to dynamic relationships in economic activities in the selected countries that are members of the European Union. The Czech Republic, Slovakia, Lithuania, and Estonia are the economies considered in this study. The reason for choosing Estonia and Lithuania is to assess the economic development after the post-soviet era and the benefits they have gained as members of the EU. The Czech Republic and Slovakia's economies are considered because they were one economy before the breakaway in 1992. The purpose of selecting trade openness and FDI inflows is that these economies are members of the EU single market that ensures the free movement of goods and services among member states. As many economies in the EU have a higher production capacity for exports than other countries, it is essential to investigate how trade openness and FDI affect these smaller economies. It is well-known that FDI and trade contribute to economic development as proved by many empirical researches. As the impact of FDI and trade openness can be negative or positive; this study research question states that is there any significant impact from FDI and trade openness on economic development? The findings from this study seek to contribute to the existing hypothesis that FDI and trade openness stimulates development.

2. LITERATURE REVIEW

This section covers FDI and economic growth, trade openness and growth, and other existing studies that have tried to investigate these variables' impact on economic growth. Many studies considered FDI inflows and trade openness with different approaches, but this review used papers related to the current work.

2.1 FDI inflows and economic growth

Much theoretical research has examined FDI challenges which include [Dunning \(1980\)](#) and [Hymer \(1976\)](#). The outcome of many empirical works on the relationships between economic growth and FDI is that the impact of FDI is not simple. FDI inflows are frequently seen as producers of employment, high productivity, competitiveness, and technology spillovers from a macro perspective ([Vintila, 2010](#)). The idea of internalization explains the expansion of multinational enterprises (MNEs) and sheds light on the drivers of foreign direct investment. These include the production cycle theory of [Vernon \(1966\)](#). [Vernon \(1966\)](#) presented a logical framework for the justifications for establishing activities in a foreign nation. This theory makes use of the notion of comparative advantage and examines the connection between the lifecycle of a product and potential FDI flows. In this theory, Vernon described various forms of FDI for US businesses in Western Europe following World War II in the manufacturing sector and holds that the production cycle has three stages ([Dunning & Lundan, 2008](#)). Conversely, the internationalization theory of [Buckley and Casson \(1976\)](#) explained the development of multinational corporations and the drivers behind their pursuit of foreign direct investment. [Buckley and Casson \(1976\)](#) developed the idea, which shows how multinational corporations set up their internal operations to create particular advantages that can later be utilized. Dunning also believes that internalization theory is crucial and incorporates it into his eclectic theory, but

he asserts that this only partially explains FDI flows (Vintila, 2010). Hymer (1976) identified two key factors that influence FDI under the internationalization theory. The first factor is the elimination of rivalry and the second was the advantages that some businesses have in a specific activity. Additionally, Dunning (1980) eclectic theory explained three FDI theories which include ownership advantage (O), location (L), and internationalization (I). The eclectic diverse paradigm OLI demonstrates that OLI parameters vary from business to business depending on the context and represent the economic, political, and social aspects of the host nation. The method of acquiring, creating, and exploiting financial materials forms the basis of the eclectic paradigm and all theories that aimed at the interpretation of international commercial activity (assets) (Bitzenis & Papadimitriou, 2011).

Pegkas (2015) studied the effect of FDI on economic growth in the Eurozone using a panel data from the period 2003 to 2012. The outcome indicated that the stock of FDI is an important factor that positively affects economic development in the Eurozone. Conversely, Mehic et al. (2013) examined the impact of FDI on economic growth in the transition economies of southeast Europe through Prais-Winsten regression with panel-corrected standard errors for the period 1998-2007. The main finding was a positive and statistically significant impact of FDI on economic advancement. Simionescu (2016) investigated the relationship between economic growth and FDI inflows in the EU at the time of the recent economic crisis. The Bayesian and panel data method are employed using data from 2008 to 2014 and concluded that since the start of the crisis, economic growth and FDI have generally been correlated in the European Union with a tendency to reduce country-to-country differences in attracting FDI. Hlavacek and Bal-Domanska (2016) analyzed FDI and its effect on development in Central and Eastern European countries from 2000-2012. The method employed was the comparative analysis and the endogenous growth model. Their results demonstrated that there is a significant relationship between the development of FDI, investment, and economic activity. The increase in the gross domestic product as a result of growing foreign direct investment is beneficial. Consequently, Lee and Brahmairene (2013) empirical results stated that economic growth is positively impacted by tourism, CO2 emissions, and FDI in the European Union. Comes et al. (2018) found both FDI and remittances to have a beneficial impact on GDP, although FDI has a stronger influence in all the countries that were studied.

Sayari et al. (2018) results provided evidence that economic freedom index and FDI are favorably impacted by the service and industry value-added components but negatively affected by the agriculture value-added component in Europe. Saglam (2017) results show that foreign direct investments harm economic growth, whereas control other variables have a favorable impact on European transition nations. Belaşcu et al. (2018) used the panel method to examine the relationship between FDI flows and economic growth in Central and Eastern European countries that are EU members. They discovered that FDI, capital, and international trade contribute positively to economic growth in these economies. Moudatsou (2003) empirical findings demonstrate that FDI has a favorable direct and indirect impact on the growth rate of EU economies (through trade reinforcement).

2.2 Trade openness impacts on growth

There have been many studies on trade openness impact on economic growth. Hadhek and Mrad (2015) results indicate that trade liberalization has a favorable impact on economic growth and that there is a significant relationship between the institutional framework and

economic growth. [Nguyen and Bui \(2021\)](#) stated that trade openness does not promote high-efficiency economic growth if it rises to a high degree (above the threshold value) without being combined with other complementary policies. [Neagu et al. \(2016\)](#) findings indicated that trade openness, inward stock of ISD, and market capitalization were found to have a rising impact on income inequality, while the educational attainment of the labor force had an equalizing impact. [Aida et al. \(2016\)](#) empirical results show that trade openness and CO₂ emission have a bidirectional causal relationship in Europe.

However, [Tahir and Khan \(2014\)](#) findings indicate that trade openness has considerably supported the progress of developing nations in the Asian region. [Raghutla \(2020\)](#) empirical results based on panel estimation method indicated trade openness has a significant positive impact on economic growth. [Huchet-Bourdon et al. \(2018\)](#) study outcome confirms that exporting nations grow more quickly based on the estimation of an endogenous growth model of 169 nations between 1988 and 2014 using a generalized method of moments estimator. More crucially, they observe a non-linear relationship between the export ratio and the caliber of the export basket.

[Nabila and Zakir \(2014\)](#) stated that the establishment of efficient policy measures to encourage trade between countries is necessary given that trade openness has an impact on financial development in all countries in their study. [Bonnal and Yaya \(2015\)](#) employed a panel of more than 200 nations and eight nonoverlapping five-year average data for the period 1975–2010. Their results of the panel data estimation imply that the majority of political institutions' stand-ins do not impede economic expansion, and the survival of these political institutions is constrained by rises in per capita income, trade openness, and education. [Ijirshar \(2019\)](#) findings indicate that trade openness has good long-term effects on growth in ECOWAS countries, but ambiguous short-term relationship. [Dritsaki and Dritsaki \(2020\)](#) used the non-causal Granger test for heterogeneous panel data to investigate the causal relationship between trade openness and economic growth in the three Baltic countries over the years 1990 to 2020. Their results indicated a cross-sectional reliance on the model time series between the counties under examination, demonstrating the shared characteristics and economic relationships among Baltic nations.

3. MATERIALS AND METHODS

3.1 Data and Variables

This study aims to investigate and explore the significance of foreign direct investment inflows and trade openness using GDP as a proxy for measuring economic growth. This study examined the effect of FDI and trade openness in four selected countries in the European Union which include the Czech Republic, Estonia, Lithuania, and Slovakia. The purpose of using these selected countries is that after the collapse of the Soviet Union, countries like Estonia and Lithuania revived their economies through economic reforms and joined the European Union for economic prosperity and the welfare of their people. The Czech Republic and Slovakia separate into two nations in 1992. Conversely, these countries enjoy the single market within the EU that ensures smooth trading among member states which eventually promotes free trade and attracts investments. However, the data used in this study was from the World Bank from 1995 to 2021 on annual frequency. The number of observations may be limited because there was no meaningful data on the selected countries during the era when

these countries were not independent. There is uniformity in the data for these countries from the selected year range. Data from 1995 is important because it gives much insight into the recent economic impact of the variables in these nations. The economic variables are real GDP, net FDI inflows, and trade openness. The most widely used method to determine nation's revenue is using its GDP, which measures the value of all market goods and services generated in the country in a year (Mumford, 2016). The real GDP uses 2015 as the based year for all the various countries.

3.2 Methods

The study used the static panel model which considers time series data and cross-sectional data simultaneously. There are two main methods under the static panel data estimations variation such as the fixed effects and random effects. In the fixed effects method, some unobservable factors correlated with independent variables. However, one step dynamic panel model is also applied. The application of this method is based on approaches in past literature (Mohan, 2007; Gokmen & Turen, 2013; Batrancea *et al.*, 2021). The tests conducted in this study include; panel model specification, collinearity, and stationarity test. However, to answer the question of whether there is any impact from foreign direct investment and trade openness on economic growth in the selected countries econometric equations were established for pooled, fixed, and random effect models, and the dynamic model. The variables used in the equations are GDP, FDI, and Trade openness. However, for a correct specification function, the variables GDP and FDI were transformed into natural logarithms. The pooled model to be estimated is in equation 1. The pooled model presume that the group has the same mean.

$$y_1 = \beta_0 + \beta_1 x_{it} + \beta_2 x_{it} + \dots + \beta_n x_{it} + \varepsilon_{it} \quad (1)$$

GDP as the dependent variable and the explanatory variables (FDI and trade openness) were substitute in the linear regression model in equation 1 to arrive at the equation 2.

$$\ln \text{GDP}_{it} = \beta_0 + \beta_1 \text{Top}_{it} + \beta_2 \ln \text{FDI}_{it} + \dots + \varepsilon_{it} \quad (2)$$

Log of GDP is the real gross domestic product measured in constant prices in the United State dollar (US) with 2015 as the based year. Trade openness indicates (the exports plus imports) ratio to GDP, and it is measured in percentage. Log of FDI represents the net investment inflows to the various economies and it is measured in current prices in US\$. However, the levels in a fixed effect model are either predetermined or based on the experimental layout of the data. A fixed impact frequently has few levels. The conditional expectation (mean) of interest is relevant in the case of the fixed effect model. The fixed effect model is in equation 3.

$$Y_{it} = \beta_1 X_{it} + \alpha_i + \varepsilon_{it} \quad (3)$$

where:

Y_{it} represents the explained variable

X_{it} stands for an explanatory variable

$\alpha_i (i = 1, \dots, n)$ is the unknown intercept for each entity (n entity-specific intercept)

β_1 represents coefficient of the explanatory variable

ε_{it} represents the error term.

The fixed effects model with the substitution of the selected variables is in [equation 4](#).

$$\ln GDP_{it} = \alpha_i + \beta_1 Top_{it} + \beta_2 \ln FDI_{it} + \dots + \varepsilon_{it} \tag{4}$$

A random effect model's levels are derived from the distribution of a random variable, probably a normal one. Randomness frequently produces effects with many degrees. The variance of the random effect is calculated. The notion is that there is no correlation between fixed and random effect models. The random effect model is [equation 5](#).

$$Y_{it} = \beta_1 X_{it} + \alpha_i + \mu_{it} + \varepsilon_{it} \tag{5}$$

where:

- Y_{it} represents the explained variable
- X_{it} stands for an explanatory variable
- $\alpha_i (i = 1, \dots, n)$ is the unknown intercept for each entity (n entity-specific intercept)
- β_1 represents the coefficient of the explanatory variable
- ε_{it} represents the within-entity error term
- μ_{it} is the between-entity error term

By substituting the selected variables for the study in the classical random effect model becomes the [equation 6](#).

$$\ln GDP_{it} = \alpha_i + \beta_1 Top_{it} + \beta_2 \ln FDI_{it} + \dots + \mu_{it} + \varepsilon_{it} \tag{6}$$

where

- $\ln GDP_{it}$ represents log of gross domestic product,
- Top_{it} indicates trade openness, and
- $\ln FDI_{it}$ stands for log of foreign direct investment.

However, investment and other factors of economic growth effect exist for some number of years and as result the panel dynamic model in [equation 7](#) is employed to assess the influence of the past GDP on the current output.

$$GDP_{it} = GDP_{it-1} + \alpha_i + \beta_1 Top_{it} + \beta_2 FDI_{it} + \lambda_t + \varepsilon_{it} \tag{7}$$

where

- α_i is the individual-specific impact, and
- λ_t shows the time-specific effect whereas
- Y_{it} is explained by the lagged value.

The country dummies are indicated in [Table no. 1](#) and represent the intercepts for each country in the between transformation model estimation.

Table no. 1 – Countries representation

Dummy	Country
Dcountry_1	Czech Republic
Dcountry_2	Slovakia
Dcountry_3	Estonia
Dcountry_4	Lithuania

Source: Author's calculations

4. RESULTS AND DISCUSSIONS

Table no. 2 shows the summary statistics of the variables, including the mean, median, standard deviation, minimum, and maximum values. The mean values of the variables are close which indicates low variability. The average mean of GDP, trade openness, and FDI are 3.86%, 134% and 0.57%, respectively. However, only FDI had a negative minimum value among the other variables. Trade openness had the highest median followed by GDP, and FDI inflows. Conversely, Table no. 3 shows the correlation matrix between the selected variables. The coefficient (0.727) of FDI shows a strong positive relationship with GDP in the selected countries. Conversely, the coefficient (0.079) of trade openness indicates a positive weaker association with GDP.

Table no. 2 – Summary Statistics

Indicator	Mean	Median	S.D.	Min	Max
Log of GDP	3.86	3.85	0.981	1.50	5.37
Trade Openness	134	137	28.2	74.8	191
Log of FDI	0.572	0.579	1.18	-2.66	2.63

Source: Author's calculations

Table no. 3 – Correlation Matrix

Log of GDP	Log of FDI	Trade Openness	
1.000	0.727	0.079	Log of GDP
	1.000	0.247	Log of FDI
		1.000	Trade Openness

Source: Author's calculations

4.1 Collinearity test

When two or more predictor variables are tightly associated with one another, this is referred to as collinearity. Collinearity between two variables can be identified using some measure of association, but it is still possible for collinearity to exist between three or more variables, even if no two variables have particularly high correlations. Table no. 4 presents the results of the Belsley-Kuh-Welsch (BKW) test for the diagnosis of collinearity. Using the lambda and Cond values, the collinearity test displays the variance proportions of the variables. Every single value has a regression coefficient variance decomposition attached to it. BKW investigations indicate that indices between 0 and 10 displays minor near dependencies, whereas indices between 10 and 30 indicate fairly significant near dependencies. There is no indication of excessive collinearity, according to the collinearity test results in Table no. 4.

Table no. 4 – Belsley-Kuh-Welsch collinearity diagnostics

Lambda	Cond	Log of GDP	Trade openness	Log of FDI
2.366	1.000	0.012	0.013	0.057
0.595	1.993	0.007	0.026	0.734
0.039	7.808	0.981	0.961	0.209

Source: Author's calculations

4.2 Stationarity Test

The Augmented Dickey-Fuller (ADF) test is used to evaluate the characteristics of the variables. The ADF testing method establishes a time series' unit root or equal value and that the variable follows the random walk property (Dickey & Fuller, 1979). The typical ADF assumes error terms with no correlation. Understanding whether a time series is stationary or non-stationary requires evaluating the time series attributes. The groups were tested using the ADF unit root hypothesis which the null hypothesis states that all groups have a unit root. The variant with constant and trend under the ADF test is used for checking the unit root presence in all the series. The inverse chi-square, inverse normal, and logit tests are all included in the Choi meta-test under the variant with constant and trend. The condition under the unit root test states that the p-value must be greater than 5% level of significance to accept the null hypothesis. On the other hand, a p-value higher than 5 percent denotes the presence of unit roots and indicates that the series is non-stationary. However, p-values less than 5% indicate no unit root and it shows that series is stationary at level. The ADF test results are in Table no. 5. The outcome of the ADF test displayed that all the variables are non-stationary at level and integrated at first-order difference I (1).

Table no. 5 – Panel ADF unit root test

Variable	Inverse Chi-square	Inverse normal test	Logit test
Log of GDP	3.901 (0.866)	1.374 (0.915)	1.371 (0.909)
Trade openness	6.848 (0.553)	-0.081 (0.468)	-0.062 (0.475)
Log of FDI	14.444 (0.071)	-0.462 (0.322)	-0.357 (0.362)
First Difference			
Log of GDP	40.719 (0.000)	-4.715 (0.000)	-5.825 (0.000)
Trade openness	35.627 (0.000)	-4.506 (0.000)	-5.111 (0.000)
Log of FDI	82.108 (0.000)	-7.686 (0.000)	-11.817 (0.000)

Source: Author's calculations

4.3 Panel Specification test

Under the panel method of estimation, there are different models which include the pooled model, fixed effect model, and the random effect model. The pooled model is always estimated first but to decide whether the pooled model is sufficient, a panel specification test is performed to determine its quality against the fixed and random effects models. The outcome of the panel specification test is indicated in Table no. 6.

Table no. 6 – Panel Specification Test

Panel model specification	Null hypothesis	P-value	Comment
F-test	Pooled model is sufficient	0.000***	Ho is rejected
Breusch-Pagan test	Pooled model is sufficient	0.000***	Ho is rejected
Hausman test	The random effect model is consistent	0.341	Ho is not rejected

Source: Author's calculation

The panel specification test has three tests that include the F-test, the Breusch-Pagan test, and the Hausman test. The rule states that low p-value counts against the null hypothesis. A p-value greater than 5 percent leads to the acceptance of the null hypothesis. The F-test compares the pooled model against the fixed effects model, and as indicated in [Table no. 6](#), the null hypothesis is rejected because the p-value is lower than the 5% threshold. It shows that the pooled model is not adequate. The Breusch-Pagan test assesses whether the pooled model is better than the random effects model, and the result displayed that the null hypothesis is rejected. The Hausman test determines whether the random effects model is sufficient over the fixed effect model. The p-value indicates the null hypothesis cannot be rejected and it signifies that the random effect model is consistent. The outcome of the panel specification test proved that the random effect model is the most appropriate over the pooled and fixed effect models.

4.4 Panel regression results

[Table no. 7](#) shows the output from the pooled model estimation. The regression coefficients of trade openness and FDI indicate that FDI had a positive impact on economic growth in the selected countries whereas trade openness negatively correlates with development. The significance level of the coefficients of FDI was at 1% and trade openness at 10%, respectively.

Table no. 7 – Pooled model estimation

Variable	Coefficient	Std. Error	Test-ratio	p-value
Constant	4.073	0.329	12.40	0.000***
Trade Openness	-0.004	0.002	-1.756	0.0821*
Log of FDI	0.640	0.059	10.93	0.000***
R ² =0.54 Adjusted R ² = 0.53 F-test p-value =0.000 Sample size=104				

Note: Significance codes: ***1%, *10%

Source: Author's calculations

The coefficient of FDI in [Table no. 7](#) displayed that a percentage in FDI inflows will lead to an increase in GDP by 0.64% in the selected economies whereas an expansion in trade openness reduces economic growth by 0.004%. The R-squared of the pooled model shows that 54% of the variation was explained in the dependent variable by the regressors. However, according to the findings from [Liargovas and Skandalis \(2012\)](#); [Fetahi-Vehapi et al. \(2015\)](#) indicated that in the long run, trade openness contributes positively to FDI inflow in economies which contradicts the finding from the pooled model of this study. On the contrary, for a deeper understanding on how each country benefits from FDI and trade openness, the between transformation was estimated. This between transformation estimation uses the countries' dummies through the pooled ordinary least square method. The intercept for the various countries is in [Table no. 8](#).

Table no. 8 – Between Transformation estimation

Variable	Coefficient	Std. Error	Test-ratio	p-value
Trade Openness	0.005	0.001	4.054	0.000***
Log of FDI	0.248	0.036	6.809	0.000***
Dcountry_1	3.986	0.151	26.45	0.000***
Dcountry_2	3.271	0.197	16.62	0.000***

Variable	Coefficient	Std. Error	Test-ratio	p-value
Dcountry_3	1.882	0.195	9.660	0.000***
Dcountry_4	2.865	0.173	16.61	0.000***
R ² =0.92	Adjusted R ² =0.91	F-test p-value =0.000	Sample size=104	

Note: Significance codes: *** 1%

Source: Author's calculation

The intercepts of the various countries in [Table no. 8](#) show that the Czech Republic has the highest followed by Slovakia, Lithuania, and Estonia, respectively. The intercept values indicate that the Czech Republic had 3.986%, 3.271% for Slovakia, 1.882% for Estonia, and Lithuania had 2.865%. The R-squared of the model showed 92% of the variation was explained in GDP by the independent variables. The high level of significance in the Czech Republic corresponds to the mass inflow of foreign direct investments since 1998. [Domesová \(2011\)](#) indicated that the role of privatization in the entrance of foreign capital, rising import intensity, and increased export efficiency associated with foreign direct investments in the Czech economy. However, Slovakia continues to receive lower FDI inflows, despite having a skilled labor force. [Bobenič Hintošová et al. \(2021\)](#) stated that fiscal incentives have the opposite effect on Slovakia's economy than financial incentives, which have a significant positive direct effect on FDI inflows. Conversely, Lithuania and Estonia have witnessed much FDI inflow since the late 90s. Although both countries' rates of growth have been greater, but Lithuania's net inflows began to increase around two years after Estonia's. According to the OECD due to the privatization of Lietuvos Telekomas, FDI in Lithuania grew even faster in 1998, increasing by 3.8 times compared to the same period the previous year. [Ligita and Rita \(2015\)](#); [Tvaronavičienė and Ginevičius \(2003\)](#) stated that the GDP relationship with FDI and exports in Lithuania's economy are highly correlated. The foundation of Estonia's economic strategy has been the creation of favorable FDI conditions and openness to foreign trade. The benefits vary depending on the type of foreign investment and trade volume. Consequently, favor nations with larger levels of FDI and trade openness is more advantageous to nations with higher levels of income per capita ([Shah & Khan, 2016](#)). However, the result from the fixed effects model is in [Table no. 9](#).

Table no. 9 – Fixed effect model estimation

Variable	Coefficient	Std. Error	Test-ratio	p-value
constant	3.001	0.170	17.80	0.000***
Trade Openness	0.005	0.001	4.054	0.000***
Log of FDI	0.245	0.036	6.809	0.000***
LSDV R ² =0.92	Within R ² =0.54	F-test p-value =0.000	Sample size=104	

Note: Significance codes: *** 1%

Source: Author's calculations

The coefficients of variables from the fixed effects result confirm the output from the between transformation estimation. However, the outcome shows that a percentage change in FDI will lead to 0.245% increase in economic growth in the selected countries. Conversely, a rise in trade openness will increase GDP by 0.005% in the selected economies. The coefficients of FDI inflows and trade openness indicate that they positively support economic development in these countries. On the other hand, [Table no. 10](#) shows the results from the

random effects model. The coefficients of FDI and trade openness assumed the same sign from the fixed effect model.

Table no. 10 – Random effect model estimation

Variable	Coefficient	Std. Error	z	p-value
constant	3.012	0.466	6.465	0.000***
Trade Openness	0.005	0.001	3.988	0.000***
Log of FDI	0.252	0.036	6.924	0.000***

Note: Significance codes: *** 1%

Source: Authors calculations

The random effects model output indicated that FDI inflows and trade openness positively support economic growth. Additionally, the result from the dynamic panel model estimation is in [Table no. 11](#). The coefficients of the independent variables confirm the positive impact of the Between transformation, fixed, and random models.

Table no. 11 – Dynamic panel estimation

Variable	Coefficient	Std. Error	z	p-value
GDP (-1)	0.892	0.010	90.73	0.000***
Trade Openness	0.073	0.024	3.080	0.002***
FDI	0.499	0.081	6.153	0.000***

Note: Significance codes: *** 1%

Source: Author's calculations

The dynamic model in [Table no. 11](#) fulfilled the three conditions condition under the Sargan over-identification test which states that firstly the p-value must be greater than 5%, secondly the p-value must not be lower than 10% and thirdly the p-value must be greater than 0.25. The Sargan over-identification test: Chi-square (92) equal to 93.8601 with a p-value of (0.426). Consequently, the null hypothesis of all instruments is valid and is not rejected because the p-value of 0.426 is higher than 5% and not less than 0.10. The test for autoregressive AR (1) and AR (2) produced p-values of (0.112) and (0.705), respectively. The outcome from the panel dynamic model indicated that FDI and trade openness positively influence growth in these countries. However, the one period lag coefficient of GDP was statistically significant and it positively influences the current output in the selected economies.

The significance of FDI inflows and trade openness in these four countries through the pooled, dynamic, fixed, and random effect model has proved that these economic variables are of greater impact in ensuring growth. FDI's positive effect may be dependent on good institutional structure and investment policies. However, factors like more efficient distribution of the resources is made possible through trade and comparative advantage between nations. Greater incentives for innovation and more inward investments may result from trade openness and liberalizing capital flows (Nikolaos & Pavlos, 2016). On the contrary, Market size, trade openness, the availability of natural resources, and economic stability are all potential predictors of FDI inflows (Jahan & Chandra Paul, 2021). However, as the intercepts of the countries differ from each other, Çelik and Basdas (2010) indicate that different nation groups experience varied effects of trade liberalization and FDI on income distribution. When a country's economy is strong, trade and financial openness boost economic growth through productivity and technical advancements. Muraraşu and Bobaşu

(2015) indicated that trade openness has a favorable impact on GDP growth, but the economy's health determines how financial links affect output synchronization between developing nations and the European Union. The likelihood of foreign investment and international trade is highest in areas with a clear trend toward openness and liberalization. Rapidly rising trade flows open up new business and investment opportunities, reduce unemployment, and ultimately lead to greater growth in these nations in the EU.

As the European Union single market ensures smooth trading among member states, it is reasonable to state that by liberalizing the financial and telecommunications sectors foster global trade and regional cooperation. The findings from this study confirm similar results from (Tariq Majeed & Ahmad, 2009; Gobinda Goswami & Haider, 2014; Seyoum et al., 2014; Kumari & Sharma, 2017; Erkisi & Ceyhan, 2019). However, Figures no. 1 and no. 2 indicate the predicted value in the dependent variable (GDP) and the fitted value from the estimated model.

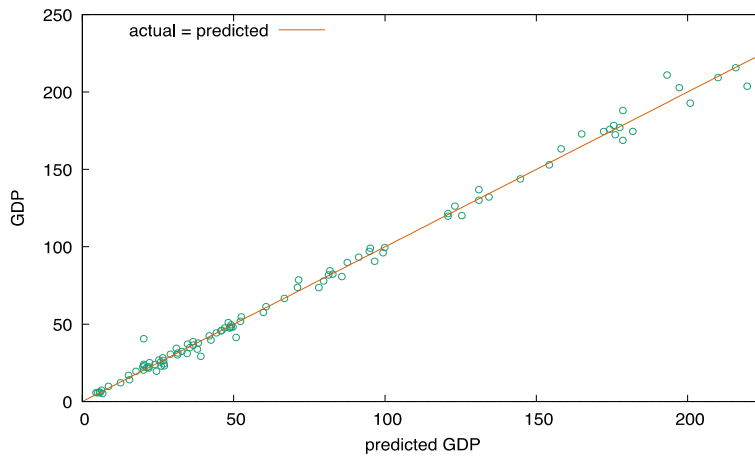


Figure no. 1 – Predicted plot in GDP

Source: Author's own plot

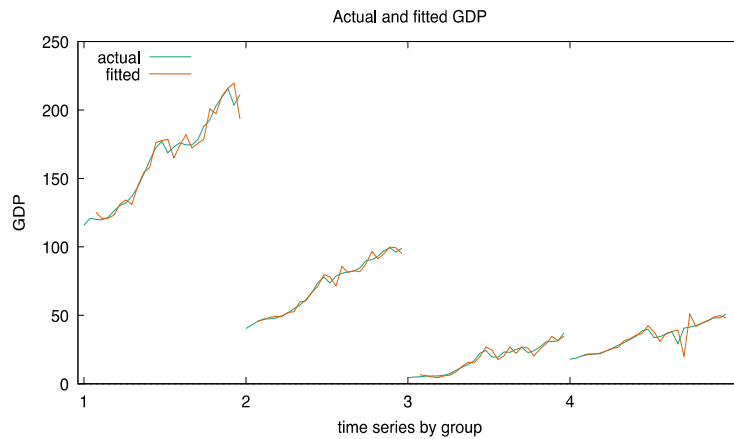


Figure no. 2 – Fitted and actual plot by the observation number

Source: Author's own plot

5. CONCLUSION

The establishment of the European Union has brought advantages to member states. Many member states are enjoying economic prosperity through FDI and trade openness. The common market, common tariffs, and mutual recognition of all goods produced in the EU have strengthened economic cooperation among countries over the years. This study aimed to investigate the impact of FDI inflows and trade openness in 4 selected countries in the European Union which include the Czech Republic, Estonia, Lithuania, and Slovakia using World Bank annual data from the period 1995 to 2021. This study employed static panel method which has the papooled model, fixed and random effects models, and the dynamic panel model. The between transformation estimation through the pooled ordinary least square indicated that both FDI and trade had a positive effect toward economic advancement and it further displayed that the Czech Republic had the highest intercept followed by Slovakia, Lithuania, and Estonia, respectively.

The panel specification test revealed that the random effect model was more appropriate over the pooled and fixed effects models. The results from the random effect model showed that FDI inflows and trade openness positively affect growth in these economies. The dynamic model estimation also confirms the positive effect of these independent variables. As the fixed effects model, random effects model, and dynamic panel model indicated a positive effect of FDI inflows and trade openness, the outcome of this study concluded that these economic indicators support economic growth and confirmed the hypothesis that FDI and trade openness stimulates growth. The empirical investigation has some policy implications for the improvement of investment and trade situations in these individual countries. The study recommends that governments should improve their business environment to attract more FDI inflows. However, the limited number of observations may not be sufficient to capture other economic indicators which support economic growth and will suggest that future research works consider increasing the number of indicators and observation period for more detailed analysis.

ORCID

Evans Yeboah  <http://orcid.org/0000-0002-0934-3996>

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