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Exploring Foreign Direct Investment–Economic Growth Nexus—Empirical Evidence from Central and Eastern European Countries

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Abstract: This study aims to examine the link between foreign direct investment (FDI) inflows and economic growth, also considering several institutional quality variables, as well as sustainable development goals (SDGs) set in the 2030 Agenda for Sustainable Development. By estimating panel data regression models for a sample of 11 Central and Eastern European countries, from 2003 to 2016, the empirical outcomes provide support for a non-linear relationship between FDI and gross domestic product per capita. Regarding institutional quality, it is found that control of corruption, government effectiveness, regulatory quality, rule of law, and voice and accountability positively influence growth, while political stability and absence of violence/terrorism is not statistically significant. Moreover, SDGs such as poverty, income distribution, education, innovation, transport infrastructure, and information technology are noteworthy drivers of growth. The outcomes of panel fully modified and dynamic ordinary least squares partly confirm the findings. The panel vector error-correction model Granger causalities provide support for a short-run one-way causal association running from FDI to growth and a long-run two-way causal connection among FDI and growth. Furthermore, in the long run, unidirectional causal relationships running from each institutional quality indicator to economic growth and FDI are set out.

Keywords: foreign direct investment; economic growth; panel data regressions; panel co-integration; Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS); panel vector error-correction model; Granger-causality

1. Introduction

In an increasingly globalized worldwide economy, investment is viewed as a catalyst for economic growth. For instance, foreign direct investment (FDI) influx supports development via productivity intensification through new investment, improved technologies, and decision-making abilities to the host nations [1–6]. Therefore, FDI lifts the host nation's economy by rising investible capital and by technological spillovers [7,8]. FDI is regarded as a collection of physical and immaterial capital that is shifted across borders and spill over to the local economy producing growth [9]. Similarly, FDI is a crucial factor in global economic integration and generates direct, stable, and long-lasting relationships between economies [10]. Moreover, Farla, et al. [11] marked off the “crowding in” which pretend that FDI will bring more investment from private inland sources and the “crowding out” which is the reverse.

In neoclassical models, long-term growth may ensue as the outcome of exogenously driven technical evolution and/or labor force growth [6]. Accordingly, new domestic businesses or the

extension of the existing ones involve employment of individuals, therefore laying the grounds for the decline of the unemployment rate. Vojtovic, et al. [12] argued that FDI is generally the key provider of capital to founder of jobs for local workers, thus being connected to growth. Likewise, the link between FDI net influxes and poverty lessening is strongly significant [13]. Nevertheless, institutions exert a significant role in technological development [14]. Hence, host-country corruption impacts multinational firms' foreign investment decisions by producing economic settings that are either fortunate for or hostile to coherent economic activity [15]. Corrupt governments may hinder human progress that rise from FDI, while large levels of bribery will harmfully influence the positive outcome that FDI may have on human development [16]. Chen, et al. [17] proved that foreign companies from countries with higher institutional quality exhibit more efficient investment activities than firms from countries with poor institutions. Gossel [18], Barassi and Zhou [19], Egger and Winner [20] argued that corruption may act as a "grabbing hand" since paying bribes generates a variety of financial misrepresentations, but also as a "helping hand" due its facility to accelerate the bureaucratic courses. Khamfula [21] found that when the level of corruption rises, then FDI is prejudiced, but when the level of corruption is related with local investment, the effect on FDI is beneficial. Hence, Gilmore, et al. [22] emphasized a set of factors which drive the selection of host market: "FDI as a preference to other forms of foreign market entry, size, and growth of the host market, government emphasis on FDI and financial incentives, economic policy, cultural closeness, costs of transport, materials and labor, resources, technology, political stability, infrastructure".

With the enlarged incorporation of capital markets after the 1990s, FDI streams turn out to be more prevalent amid the developing nations [23]. FDI supported Central and Eastern European countries (hereinafter "CEECs") to change their product structure to get comparable to the more developed European Union (hereinafter "EU") nations. Therefore, momentum to economic growth is expected, alongside mitigation of the development gap among the more advanced CEECs and the EU [24]. For instance, Damijan and Rojec [25] established that FDI is a central driver of manufacturing field reform and productivity growth in Central European Countries. Different to other capital streams, FDI is less unstable and does not show a pro-cyclical conduct [26]. Likewise, FDI has an crucial role in the enhancement and structural recovery of the CEECs [27]. However, emerging states with matching economic and state governance structures fail to entice a comparable level of inward FDI due to unproductive business setting [28]. These states should counterbalance the compromise from the advantages that ensue from FDI, such as technology transfer and employment, with the costs allied with increased short-term flows [29]. Fawaz, et al. [30] highlighted extensive variances across high-income and low-income developing nations with reference to institutions, openness in capital markets, aversion to redistribution policies, or culture. Thus, Lipsey [31] argued that nations which show reliable and predictable legal systems and efficient public administration may get more investment than states with deprived governance. In the same vein, Tun, et al. [32] strengthened that better institutions entice more FDI inflows since it creates for multinational corporations a propitious business and investment environment. Nonetheless, according to Henderson [33], favoritism entails boundaries in capital markets, export/import markets, and licensing of production rights, all supporting companies that locate in the national capital. Also, Kottaridi, et al. [34] claimed that foreign investors are not confident in Central and Eastern Europe (CEE) countries' governments concerning proper use of funds in education. Hence, transition economies show lack of transparency, weak standards of business conduct, poor protection of creditor and minority shareholder rights [35]. The Central and Eastern European countries register fragile economic and social institutions, but show a high potential of economic growth attributable to unsaturated markets, as well as a great extent of FDI appeal because of the geopolitical status of the region [5]. Nevertheless, CEECs show a poor knowledge regarding harnessing the capital richness at their disposal, thus requiring an extended time for getting rid of bureaucratic impediments [36].

Previous papers explored the effect of FDI and institutional quality on economic growth for datasets covering Association of Southeast Asian Nations (hereinafter "ASEAN") states [37], developing

countries, located in the lower- and middle-income groups [38], developing markets and developed economies [39], non-OECD nations [40], Pacific Island countries [41], African nations [42], North African states [43], Southern African countries [44], sub-Saharan African nations [45] or various groups of nations [46]. Therefore, the empirical evidence on foreign direct investment, institutional quality, economic growth link is limited for the CEECs. Throughout the communist regime, the transition economies were isolated, falling behind the Western part with reference to key technologies, skills, and capabilities [47]. The analysis of FDI within this region is important since it has acted as an imperative instrument for catching up. As such, the primary aim of current research is to empirically explore the influence of FDI on economic growth, also considering the institutional quality, for the case of CEECs. As well, measures regarding the 2030 Agenda for Sustainable Development [48] are covered, namely poverty (Goal 1: End poverty in all its forms everywhere), income distribution (Goal 10: Reduce inequality within and among countries), education (Goal 4: Quality education), innovation, transport infrastructure and, information technology (Goal 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation), along with country-level controls. Subsequently, the causal associations between economic growth, FDI, and institutional quality will be explored. Our study differs from prior surveys on CEECs [5,12,49] in two ways: first, we consider the institutional context and, secondly, we provide evidence on the existing causal relationships. The novelty of current research is the broader inclusion of all Worldwide Governance Indicators, especially for the CEECs, as proxies for institutional quality, namely control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, rule of law estimate, voice, and accountability.

The remainder of the manuscript is organized as follows. The second section provides a survey of the related empirical studies. The third section presents the econometric methodology, specifically database, variables, and quantitative methods. The fourth section reports on the selected data and shows the quantitative findings of the study. The final section provides concluding remarks and policy recommendations.

2. Literature Survey

2.1. Earlier Papers Worldwide on FDI–Economic Growth Connection

The causal link between foreign direct investment (hereinafter “FDI”) and gross domestic product (hereinafter “GDP”) growth can run in either way [50]. In line with the “FDI-led growth hypothesis”, FDI influxes can arouse growth for the host countries by rising the capital stock, generating new job opportunities, and easing the spread of technology. Conversely, the “market size hypothesis” supposes that a fast GDP growth making new investment opportunities in the host state can also cause higher inflows of FDI. Even if FDI is predictable to increase host economic growth, Zhang [51] exposed that the degree to which FDI is growth-enhancing appears to hinge on nation-specific features.

Iamsiraroj and Doucouliagos [52] performed a meta-regression analysis and emphasized a positive link between growth and FDI, being higher among single country investigations than within cross-country examinations. As such, Leitão and Rasekhi [53] explored the effect of FDI on real GDP per capita of Portugal, from 1995 to 2008, via panel data fixed-effects and random-effects regression models and found that foreign direct investment promotes growth. Mahapatra and Patra [54] supported the noteworthy role of FDI towards economic growth in India. Using provincial panel data from China, Chan, Hou, Li and Mountain [3] found both in the short and long-run that FDI has a significantly positive effect on GDP. The South Asian Association for Regional Cooperation (SAARC) was explored by Saini, et al. [55] which shown that FDI influx positively influence real GDP, gross national income, and export growth, but negatively financial position and trade openness. Likewise, Mahadika, et al. [56] provided evidence for Indonesia by means of vector autoregressive model that there is a long-term connection amid GDP, FDI, and export volume. Alshamsi, et al. [57] estimated an auto regressive distributed lag model for The United Arab Emirates and confirmed that GDP per capita had a significant positive connection with FDI. For the case of South Africa, Sunde [58] identified unidirectional causality

running from foreign direct investment to economic growth. Kinuthia and Murshed [59] highlighted that economic growth drives growth of FDI in Kenya, whereas increase in FDI inflows Granger-causes an increase in economic growth in Malaysia. On the contrary, Akinlo [60] established for Nigeria that FDI positively influence growth, but after a sizable lag and it is not significant. In the same vein, Abdallah and Abdullahi [61] employed the vector error-correction model as method of estimation for Nigeria during 1980–2009 and revealed the lack of causal association among FDI and growth in the short term, but a negative relationship in the long term. Also, Yalta [50] noticed that there is no statistically significant association between FDI and economic growth in China. For the case of Turkey, from 1992–2007, Temiz and Gokmen [8] proved both in the short and long-run the lack of significant relationship between FDI and economic growth. Carbonell and Werner [62] reinforced for Spain that FDI is not a driver of growth.

Furthermore, Herzer, et al. [63] pointed out that cross-country studies mostly suggest a positive role for FDI in stimulating economic growth. Ndiaye and Xu [64] studied seven countries belonging to the West African Economy Monetary Union and confirmed the positive influence of FDI on growth. For a dataset comprising 35 developing and 31 developed nations, Ketteni and Kottaridi [9] noticed a positive impact of FDI on growth, but a growing effect as the share of FDI within the state increases. In contrast, Schneider [65] revealed for a panel sample of 47 developed and developing nations, from 1970 to 1990, that FDI show no significant relationship with economic growth, except for developed countries. As well, Herzer, Klasen and Nowak-Lehmann [63] noticed for 28 developing states that there occurs neither a long-term, nor a short-term effect of FDI on growth. Moreover, Dutta and Roy [66] proved that the association between financial development and FDI inflows is strictly non-linear, similar to Kottaridi and Stengos [67] which confirmed that a non-linear association occurs between FDI influxes and growth. By means of threshold regression, Jyun-Yi and Chih-Chiang [68] documented that FDI can endorse economic growth when the host nation has reached a particular threshold of development, initial GDP, and human capital. Correspondingly, Nguyen and To [37] found two threshold levels of FDI.

An overview of the studies on the foreign direct investment–economic growth nexus worldwide is provided in Table 1.

Table 1. Earlier studies on FDI and economic growth worldwide.

Author(s)	Time Span	Database	Empirical Methods	Outcomes
Awad and Ragab [42]	1989–2014	53 African nations	Linear dynamic panel data model	Positive effect of FDI on growth
Alvarado, et al. [69]	1980–2014	19 Latin American states	Panel data fixed-effects models	FDI does not have a positive influence on growth except high-income countries (Chile and Uruguay)
Malikane and Chitambara [44]	1980–2014	8 Southern African states	General Methods of Moments (GMM)	FDI has a direct positive influence on economic growth
Iamsiraroj [46]	1971–2010	124 cross-country data	Simultaneous system of equations	Bidirectional relationship between FDI and economic growth
Mahmoodi and Mahmoodi [70]	1986–2013	8 European developing nations and 8 Asian developing states	Panel-VECM	Two-way causality between GDP and FDI for the European developing panel
Gui-Diby [71]	1980–2009	50 African nations	SYS-GMM	Negative link among FDI inflows and economic growth from 1980–1994 Positive link between FDI influxes and economic growth from 1995–2009
Omri and kahouli [72]	1990–2010	13 Middle East and North Africa states	GMM	Two-way causal relationship between foreign investment and economic growth
Feeny, Iamsiraroj and McGillivray [41]	1971–2010	209 states	Ordinary Least Squares and GMM	FDI is related with higher rates of economic growth in the Pacific
Lee [73]	1971–2009	19 nations of the G20	Co-integration tests and fixed-effects models	FDI influxes drive economic growth
Freckleton, Wright and Craigwell [39]	1998–2008	42 developing nations and 28 developed states	Panel dynamic ordinary least squares	In both the short-run and the long-run, FDI has a significant impact on economic growth
Tekin [74]	1970–2009	18 least developed countries	Panel Granger-causality	FDI Granger-cause GDP in Benin and Togo GDP Granger-cause FDI in Burkina Faso, Gambia, Madagascar, and Malawi
Pegkas [1]	2002–2012	18 Eurozone nations	Fully Modified OLS (FMOLS) and Dynamic OLS (DOLS) methods	FDI positively influence economic growth
Mahembe and Odhiambo [7]	1980–2012	Southern African Development Community (SADC) nations	Granger-causality	One-way causal flow from GDP to FDI in the middle-income states Lack of causality in low-income nations
Vojtovic, Klimaviciene and Pilinkiene [12]	1997–2014	11 Central and Eastern Europe (CEE) countries	Granger-causality and Vector autoregression (VAR)	FDI Granger-causes GDP

Source: Authors' work based on existing literature.

2.2. Previous Studies in CEECS on FDI–Economic Growth Link

Transition economies may benefit from FDI since it could cover the current account scarcity, fiscal deficit, also supplementing insufficient inland funds to finance both ownership change and capital formation [35]. The CEECs reveal the advantage of refining their legal and institutional backgrounds as a prerequisite for joining the EU, thereby improving their benefits in order to call foreign investors [75]. In this regard, Jones, et al. [76] emphasized that EU affiliation had a significant consequence on the FDI in the CEECs, more than doubling the amount of the projects placed in these states compared to before the beginning of the accession dialogs. As such, a positive impact of FDI on growth is predictable. For instance, Campos and Kinoshita [77] explored 25 transition economies in Central Europe and in the former Soviet Union from 1990 to 1998 and found that the effect of FDI on economic growth is positive and statistically significant. Apergis, et al. [78] explored 27 economies in transition during 1991–2004 and concluded that FDI has a significant connection with economic growth in the case where all states are encompassed in the sample. Nevertheless, after the sample was divided into low- and high-income nations and in states with effective and not effective privatization plans, the inference preserve only for the case of the high-income economies and economies with fruitful denationalization agendas. Yormirzoev [79] investigated the states of Central and Eastern Europe, alongside the Commonwealth of Independent States, from 1992 to 2009 and confirmed a positive association between FDI and growth. Hlavacek and Bal-Domanska [49] investigated Central and Eastern European nations amid 2000 and 2012 and proved that statistically significant associations occur among economic growth, FDI, and investment growth. By exploring 16 Central, Eastern, and Southeastern European states during 1998–2013, Miteski and Stefanova [80] documented that FDI influxes in industry and services positively influence economic growth, whereas FDI in the construction sector did not show a statistically significant effect.

On the contrary, Mencinger [81] proved for a sample of eight EU candidates in 2004 a negative relationship between FDI and growth explained by the fact that takeovers were the prime means of entrance for overseas investors, while the capital employed for purchasing the companies was later focused on consumption and imports, thus failing to increase efficiency. Bačić, et al. [82] explored 11 CEECs from 1994 to 2002 and found that FDI is insignificant for growth. Kherfi and Soliman [83] found a negative or statistically insignificant effect of FDI on economic growth in MENA and non-EU accession CEECs, but a positive impact only in EU accession countries. Hence, FDI role concerning growth in transition economies is conditional upon applying extensive economic transformations or pointing out solid engagement to completing such reforms. As well, Ferencikova and Dudas [84] analyzed eight new EU member states during 1993–2003 and proved that the influx of FDI did not support economic growth, whereas wide FDI influxes are followed by slow GDP growth. Curwin and Mahutga [85] reinforced for 29 Central and Eastern European and Eurasian post-socialist transition nations from 1990 to 2010 that FDI diffusion lessens economic growth in the short and long term. Saglam [86] established for 14 European transition states for the period 1995–2014 that economic growth rate decreases by 0.0162% when FDI increases by 1%.

A summary of the existing literature on the foreign direct investment–economic growth nexus in CEECs is provided in Table 2.

Table 2. Earlier studies on FDI and economic growth in CEECs.

Author(s)	Time Span	Database	Empirical Methods	Outcomes
Vojtovic, Klimaviciene and Pilinkiene [12]	1997–2014	11 CEECs	Granger-causality and VAR	FDI Granger-causes GDP
Comes, et al. [87]	2010–2016	7 CEECs	The method of least squares and the method of least squares with dummy variables	Positive influence of FDI on economic growth
Simionescu [88]	2003–2016	8 CEECs	Bayesian bridge regressions	FDI was the most significant driver of economic growth
Belaşcu, Popovici and Horobeţ [75]	1999–2013	5 CEE countries	Panel least squares regression	FDI have a positive influence on economic growth
Bayar [89]	2003–2015	11 CEECs	Panel causality test	Greenfield and brownfield investments positively impact economic growth, but the effect of greenfield investments was higher
Silajdzic and Mehic [90]	2000–2011	10 Central and East European countries	OLS and Granger-causality test	FDI positively influence economic growth
Silajdzic and Mehic [91]	2000–2013	10 Central and East European countries	OLS with panel-corrected standard errors - PCSE (fixed-effect)	FDI contribute to economic growth
Albulescu [92]	2005–2012	13 CEECs	System-GMM	Direct and portfolio investments impact long-term economic growth
Pharjiani [93]	1995–2012	10 CEECs	Ordinary least squares, random effects, fixed effects, first differences estimation	Positive link between FDI and economic growth
Sârbu and Carp [94]	2000–2013	Romania	OLS and Johansen co-integration	FDI positively influence economic growth
Nistor [95]	1990–2012	Romania	OLS	FDI inflows positively influence GDP
Mehic, et al. [96]	1998–2007	Seven southeast European nations	Prais–Winsten regression with panel-corrected standard errors	Positive and statistically significant impact of FDI on economic growth
Acaravci and Ozturk [26]	1994–2008	10 transition European countries	ARDL bounds testing approach and the error-correction-based Granger-causality	Causal association amid FDI, export, and economic growth in four states

Source: Authors' work based on existing literature.

2.3. Preceding Examinations on FDI–Institutional Quality Association

The association among institutional factors and FDI is generally defined through its positive or negative consequences, with features such as self-governing organizations, political solidity, and rule of law appealing FDI and issues such as corruption, tax policies and cultural distance discouraging FDI [97]. Dunning [98] postulated that a company requires ownership, location, and internalization benefits to cross borders and engage in FDI. Furthermore, the institutional theory of North [99] highlighted that institutions set out market guidelines, shape connections between economic actors and guarantee that economic arrangements are circumscribed by these directions. However, investors are refractory with reference to states where institutional ambiguities boost bribery, red tape rises the transaction cost of investment, and where the administration can seize investments [100]. Multinational corporations are fascinated by states wherein civil and political independence is valued [101]. Therefore, good quality institutions in the host state are a prerequisite for appealing FDI influxes into that nation [102].

According to Buchanan, Le and Rishi [2], FDI goes to states with better quality institutions, while reduced governance can obstruct FDI. Xu [103] supported that economic freedom of both the homebased state and the host nation are positively associated with FDI. Adversely, Daniele and Marani [104] revealed that crime appears as a disincentive for foreign investors arguing that high levels of crimes are viewed as a signal of a local socio-institutional setting adverse for FDI. Akhtaruzzaman, et al. [105] proved that a one-standard-deviation decrease in seizure risk is related with a 72% rise in FDI. Similarly, Peres, et al. [106] reported for developed states that a one-standard-deviation modification in governance affects FDI by a factor of 0.2225, while the association is not significant for developing countries. By generating ambiguity in investment outcomes and by dropping the anticipated returns, fraud daunts the investment activity of the businesses, which renders into forgone economic growth [107]. The “grease the wheels” hypothesis supported by Kato and Sato [108] advises that corruption can accelerate economic activity under conditions of weak governance structures and ineffective policy. Elheddad [109] underlined that overseas companies choose to invest their money in corrupted extents which let them more admission to the natural resource and reduced taxes. Quite the reverse, the “sand the wheels” hypothesis proved by Meon and Sekkat [110], Cooray and Schneider [111], claims that corruption can be expensive for economic activity. Farla, Crombrughe and Verspagen [11] did not provide robust evidence of a positive connection amid “good governance” and upper levels of investment but exhibited that the interplay between foreign investment and governance has an adverse mediating consequence on investment.

A brief review of previous papers on the FDI and institutional quality connection is exhibited in Table 3.

Table 3. Earlier studies on FDI and institutional quality.

Author(s)	Time Span	Database	Empirical Methods	Outcomes
Brada, Drabek, Mendez and Perez [15]	2005–2009	43 home countries and 151 host countries	Poisson pseudo maximum-likelihood (PPML) estimation	Fewer FDI in corrupt nations
Dang [112]	2006–2007	60 provinces in Vietnam	Instrumental variable (IV) approach	FDI supports the enhancement of institutions
Asamoah, et al. [113]	1996–2011	40 Sub-Saharan African states	GARCH models	Institutional quality rises the stream of FDI
Buchanan, Le and Rishi [2]	1996–2006	164 nations	OLS regressions	Positive influence of institutional quality on FDI Institutional quality negatively influences the volatility of FDI
Kuzmina, et al. [114]	1895–1914	Russia	OLS and IV-2SLS regressions	Greater incidence of illicit payments, alongside burden from governing organizations, enforcement authorities, and criminals diminish FDI
Busse and Hefeker [115]	1984–2003	83 developing countries	Panel data fixed-effects and GMM regressions	Government stability, internal and external conflict, corruption and ethnic strains, regulation and order, democratic accountability of government, and quality of bureaucracy are drivers of foreign investment inflows
Zakharov [107]	2004–2013	79 Russian regions	Panel data fixed-effects and IV estimation with fixed-effects	Negative association between corruption and the influx of FDI
Adams and Opoku [45]	1980–2011	22 sub-Saharan African states	GMM	Regulation–FDI connections positively influence economic growth
Wisniewski and Pathan [116]	1975–2009	33 OECD members	Pooled OLS, Fixed-effect panel, Two-way fixed-effect panel	Higher FDI are held by states with presidential systems and long democratic tradition
Asiedu and Lien [117]	1982–2007	112 developing countries	GMM	Democracy supports FDI in nations where the portion of natural resources in total exports is reduced, but has a negative influence on FDI in nations where exports are dominated by natural resources
Aziz [118]	1984–2012	16 Arab countries	GMM	Institutional quality measures of economic freedom, ease of doing business and international country risk positively influence FDI influses
Egger and Winner [20]	1995–1999	73 developed and less developed nations	Fixed effects, Hausman–Taylor, and between regressions	Corruption is an incentive for FDI
Delgado, McCloud and Kumbhakar [40]	1985–2002	60 non-OECD countries	OLS, 2SLS, semiparametric smooth coefficient, nonparametric method of moments models	A 1-point rise in the level of corruption determines a decline of FDI returns between 0.07 and 5.91%
Jude and Leveigue [38]	1984–2009	93 developing countries	Panel smooth regression model	FDI positively influence growth beyond a certain threshold of institutional quality
Zghidi, Mohamed Sghaier and Abida [43]	1980–2013	4 North African countries	System GMM	The outcome of FDI is more prominent when the economic freedom measure occurs
Economou [4]	1996–2017	4 South European states	Random-effects panel data estimations and generalized two-stage least squares (G2SLS) random-effects instrumental variable (IV) regression	Positive influence on FDI related to protection of property rights, government integrity, monetary freedom, and financial freedom
Tintin [5]	1996–2009	6 Central and Eastern European nations	Panel data fixed-effects models	Better institutions entice more FDI influses
Uddin, et al. [119]	1972–2016	Pakistan	Multivariate OLS regression and VAR system	Democracy rises the inward FDI in the short-run, while a military government has a stronger effect on FDI in the long run

Source: Authors' work based on existing literature.

3. Data and Methodology

3.1. Sample Selection and Variables

The dataset used in this study spans the period from 2003 to 2016, common for all selected measures and comprises 11 Central and Eastern European countries, namely Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia. World Bank and Eurostat databases have been employed to gather the statistical data. The selected variables are listed in Table 4. Throughout the sample period, there is missing data on many variables, which diminish our data set for each model differently. Following preceding studies [2,19,39,41,42,46,57,61], we consider our dependent variable as GDP per capita. In line with earlier studies [2,41,57,61,69], inflows of FDI were considered. Furthermore, we comprise measures set out in the 2030 Agenda for Sustainable Development [48], relating to poverty [13], inequality of income distribution [59,112], education [3,13,20,34,39,41–43,46,52,71,112,118], innovation [14,28,65,104], transport infrastructure [3,13,52,114], information technology [13,28], institutional quality [2,13–15,18–20,28,39,41,42,44,46,52,107,115,117,118]. The estimate of each Worldwide Governance Indicators provides the nation's score on the aggregate indicator, in units of a standard normal distribution, fluctuating from roughly –2.5 to 2.5, with higher values pertaining to better governance. Moreover, country-level control measures are included, namely government expenditure [12,40,42,46,64,71,72,116], urbanization [69], domestic credit to the private sector [41,46,72] and trade [2,5,13,18,19,34,40,42–44,46,52,53,55,61,64,69,72,118].

Table 4. Description of the variables.

Variables	Definitions	Source	Data Availability
<i>Variables concerning sustainable economic growth</i>			
(1) GROWTH	Gross domestic product per capita (current prices, euro per capita) (log values)	Eurostat (nama_10_pc)	1975–2016
<i>Variables concerning foreign direct investment</i>			
(2) FDI	Foreign direct investment, net inflows (% of GDP)	World Bank (BX.KLT.DINV.WD.GD.ZS)	1970–2018
<i>Variables concerning poverty</i>			
(3) POV	Individuals at risk of poverty or social exclusion (percentage)	Eurostat (ilc_peps01)	2003–2016
<i>Variables concerning the inequality of income distribution</i>			
(4) INEQ	Income quintile share ratio as the ratio of total income received by the 20% of the population with the highest income—top quintile) to that received by the 20% of the population with the lowest income—lowest quintile (percentage)	Eurostat (ilc_di11)	1995–2016
<i>Variables concerning education</i>			
(5) EDU	Pupils and students as the total number of persons who are enrolled in the regular education system in each country. It covers all levels of education from primary education to postgraduate studies, excluding pre-primary education (log values)	Eurostat (educ_ilev)	1998–2012
<i>Variables towards innovation</i>			
(6) INNOV	The number of patent applications to the European patent office (log values)	Eurostat (pat_ep_ntot)	1978–2014
<i>Variables concerning transport infrastructure</i>			
(7) TRANSP	The length of motorways, on the territory of the reporting country (km) (logarithmic values)	Eurostat (ttr00002)	1970–2015
<i>Variables concerning information technology</i>			
(8) IT	Individuals using the Internet (% of population)	World Bank (IT.NET.USER.ZS)	1960–2017

Table 4. Cont.

Variables	Definitions	Source	Data Availability
<i>Variables concerning institutional quality</i>			
(9) CORR	Control of Corruption Estimate captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as “capture” of the state by elites and private interests (score)	World Bank (Worldwide Governance Indicators)	1996–2016
(10) GOV_EFF	Government Effectiveness Estimate captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies (score)	World Bank (Worldwide Governance Indicators)	1996–2016
(11) POL_STAB	Political Stability and Absence of Violence/Terrorism Estimate measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism (score)	World Bank (Worldwide Governance Indicators)	1996–2016
(12) REG_Q	Regulatory Quality Estimate captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development (score)	World Bank (Worldwide Governance Indicators)	1996–2016
(13) RULE_LAW	Rule of Law Estimate captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence (score)	World Bank (Worldwide Governance Indicators)	1996–2016
(14) VOICE_ACC	Voice and Accountability Estimate captures perceptions of the extent to which a country’s citizens can participate in selecting their government, as well as freedom of expression, freedom of association, and a free media (score)	World Bank (Worldwide Governance Indicators)	1996–2016
<i>Country-level control variables</i>			
(15) GOV_EXP	General government final consumption expenditure (% of GDP)	World Bank (NE.CON.GOV.ZS)	1960–2018
(16) URB	Urban population (percentage of total)	World Bank (SP.URB.TOTL.IN.ZS)	1960–2016
(17) DCPS	Domestic credit to private sector (percentage of GDP)	World Bank (FS.AST.PRVT.GD.ZS)	1960–2016
(18) TRADE	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product (percentage of GDP)	World Bank (NE.TRD.GNFS.ZS)	1960–2016

Source: Authors’ work based on Eurostat and World Bank descriptions.

3.2. Quantitative Techniques

The most common methods identified in the literature concerning the influence of FDI on economic growth are panel data fixed-effects and random-effects estimations [1,2,13,28,41,53,64,65,69,107,114], as well as the generalized method of moments [9,18,41–45,71,72,113,117]. Current paper employs the first approach, the econometric specifications being depicted as follows:

$$GROWTH_{it} = \beta_0 + \beta_1 \times FDI_{it} + \beta_2 \times SDGs_{it} + \beta_3 \times CV_{it} + \varepsilon_{it} \quad (1)$$

$i = 1, 2, \dots, 11, t = 2003, 2004, \dots, 2016$.

where the dependent variable is GDP per capita in CEECs. *FDI* is a measure of inward FDI flows. *SDGs* signifies a vector of explanatory variables concerning sustainable development goals [48]. *CV* depicts the country-level control variables. β_0 describes the country-specific intercept, β_1 – β_3 are the coefficients to be estimated, ε is the error term, i is the subscript of recipient FDI CEE nation, and t is the subscript of time and accounts for the unobservable time-invariant individual specific effect, not included in the regression [34].

Likewise, to inspect for a potential non-linear association between FDI and growth, the squared term of FDI (hereinafter “*FDI_SQ*”) will be encompassed in the aforementioned equation:

$$GROWTH_{it} = \beta_0 + \beta_1 \times FDI_{it} + \beta_2 \times FDI_SQ_{it} + \beta_3 \times SDGs_{it} + \beta_3 \times CV_{it} + \varepsilon_{it} \quad (2)$$

$i = 1, 2, \dots, 11, t = 2003, 2004, \dots, 2016$.

The next step is to determine the order of integration. To examine the stationarity of the series, several tests will be performed, such as Augmented Dickey–Fuller (hereinafter “*ADF*”) [1,3,8,14,39,56–58,61,70,73], Phillips–Perron (hereinafter “*PP*”) [1,7,39,58,61,70,73], Levin–Lin–Chu (hereinafter “*LLC*”) [1,13,14,39,70,73,118], Im–Pesaran–Shin (hereinafter “*IPS*”) [1,7,13,14,39,70,73,118] and Breitung [3,39,70,73]. In the ADF and PP tests, the size of the coefficient δ_2 from the further equation should be established [58]:

$$\Delta Z_t = \delta_0 + \delta_1 t + \delta_2 Z_{t-1} + \sum_{i=1}^n \beta_i \Delta Z_{t-i} + \varepsilon_t \quad (3)$$

where the variable ΔZ_{t-1} depicts the first differences with n lags. ε_t signifies the variable that adjusts the errors of autocorrelation. The coefficients δ_0 – δ_2 and β_i are those estimated. The ADF regression checks for the occurrence of unit root of Z_t in all model variables at time t . The null and the alternative hypothesis for the presence of unit root in variable Z_t is depicted below:

$$H_0: \delta_2 = 0 \quad H_1: \delta_2 < 0 \quad (4)$$

Regarding the PP test, the equations and hypotheses are analogous to those of ADF, but the lags of the variables are left out from the models, as follows:

$$\Delta Z_t = \delta_0 + \delta_1 t + \delta_2 Z_{t-1} + \varepsilon_t \quad (5)$$

The LLC test presumes homogeneity in the dynamics of the autoregressive coefficients for all panel members, whereas the IPS test allows heterogeneity in dynamic panel and intertemporal data [1]. Breitung proposes a test statistic that does not apply a biased adjustment whose power is considerably higher than LLC or the IPS tests by means of Monte Carlo trials [70].

Moreover, several panel co-integration tests will be achieved, respectively Pedroni [1,7,39,70], Kao [70] and Fisher-type Johansen [8,56,61,73]. If the variables are cointegrated, there occurs a force

that converges into a long-run equilibrium [73]. Pedroni [120] advised the calculation of the regression residuals from the hypothesized cointegrating regression, as below:

$$y_{i,t} = \alpha_i + \delta_i t + \beta_{1i} x_{1i,t} + \beta_{2i} x_{2i,t} + \dots + \beta_{Mi} x_{Mi,t} + e_{i,t} \quad (6)$$

for $t = 1, \dots, T, i = 1, \dots, N, m = 1, \dots, M$.

where T denotes the number of observations over time, N signifies the number of individual members in the panel, and M depicts the number of regression variables.

Kao [121] proposed a parametric residual-based panel co-integration, whereas Maddala and Wu [122] suggested the use of Fisher-type panel co-integration test via the methodology of Johansen [123] for the reason that the maximum-likelihood procedure has significantly large and finite sample properties.

After co-integration is settled, the long-run associations will be estimated via Fully Modified Ordinary Least Squares (hereinafter "FMOLS") and Dynamic Ordinary Least Squares (hereinafter "DOLS") in line with prior studies [1,14,39]. The FMOLS estimator produces consistent estimates in small samples and controls for the endogeneity of the regressors and serial correlation, whereas the DOLS estimator removes the second order bias triggered by the fact that the independent variables are endogenous [1]. Therefore, the causal relationships will be established, similar to earlier studies [7,51,58,61,70]. Thus, six tri-variate panel vector error-correction models (hereinafter "PVECM") for investigating the connection between FDI, each institutional quality measure and economic growth will be estimated:

$$(1 - L) \times \begin{bmatrix} GROWTH_t \\ FDI_t \\ IQ_t \end{bmatrix} = \begin{bmatrix} \alpha_{11} \\ \alpha_{21} \\ \alpha_{31} \end{bmatrix} + \sum_{i=1}^p (1 - L) \times \begin{pmatrix} \phi_{1i} & \beta_{1i} & \psi_{1i} \\ \phi_{2i} & \beta_{2i} & \psi_{2i} \\ \phi_{3i} & \beta_{3i} & \psi_{3i} \end{pmatrix} + \begin{bmatrix} \theta \\ \omega \\ \xi \end{bmatrix} \times ECT_{t-1} + \begin{bmatrix} \eta_{1t} \\ \eta_{2t} \\ \eta_{3t} \end{bmatrix} \quad (7)$$

where IQ denotes the institutional quality variables, $(1 - L)$ depicts the difference operator, ECT_{t-1} signifies the lagged error-correction term that ensues from the long-run cointegrating connection, $\eta_{1t} - \eta_{2t}$ exhibits the white noise serially independent random error terms. The occurrence of a significant association in first differences of the variables reveals the direction of short-run causality, whereas long-run causality is exposed by a significant t-statistic relating to the error-correction term (hereinafter "ECT") [58].

4. Empirical Results and Discussion

4.1. Descriptive Statistics and Correlations

Table 5 reveals the summary statistics for the measures selected in the empirical analysis. The mean level of FDI inflows equaled 5.39% of GDP. Figure 1 shows the temporal evolution of the FDI inflows in CEECs and provides evidence that Slovenia (2.00%) and Lithuania (3.32%) registered the lowest mean values regarding FDI inflows, whereas Bulgaria (8.91%) and Hungary (11.45%) the highest average values. With reference to poverty, we notice that the mean share of individuals at risk of poverty or social exclusion is 29.39%, whereas the average income quintile share ratio is 5.06%. Moreover, a mean value of 35.55% of individuals out of CEECs are using the Internet. Concerning the average values of the variables regarding institutional quality, we notice a poor governance in the CEECs.

The average values of Worldwide Governance Indicators for every selected country are revealed in Figure 2. With reference to control of corruption estimate, the lowest mean values are registered in Romania (−0.21) and Bulgaria (−0.15), whereas the highest mean values in Slovenia (0.90) and Estonia (1.06). Government effectiveness estimate shows the bottom mean figures in Romania (−0.23) and Bulgaria (0.12), but the uppermost mean figures in Slovenia (1.014) and Estonia (1.015). Regarding political stability and absence of violence/terrorism estimate, the lowest mean values are reported in Romania (0.20) and Bulgaria (0.24), while the highest mean values are exhibited in the Czech Republic

(0.98) and Slovenia (1.03). Regulatory quality estimate reveals the lowest average numbers in Romania (0.45) and Croatia (0.47), while the highest average numbers in the Czech Republic (1.13) and Estonia (1.43). Relating to the rule of law estimate, Bulgaria (−0.08) and Romania (0.004) shows the lowest mean values, whereas Slovenia (0.99) and Estonia (1.12) point out the highest mean values. In terms of voice and accountability estimate, Romania (0.42) and Bulgaria (0.51) displays the lowest average figures, but then again Slovenia (1.05) and Estonia (1.10) the highest mean figures.

Table 5. Descriptive statistics (raw data).

Variables	Obs.	Mean	Std. Dev.	Min	Max
(1) GROWTH	230	8310.43	4407.87	1000.00	19600.00
(2) FDI	209	5.39	7.07	−15.99	54.84
(3) POV	125	29.39	10.22	13.30	61.30
(4) INEQ	146	5.06	1.39	3.00	8.30
(5) EDU	160	1950.91	2353.90	237.60	9153.10
(6) INNOV	250	58.55	86.03	0.50	609.16
(7) TRANSP	280	422.50	364.20	0.00	1883.90
(8) IT	263	35.55	28.75	0.00	87.24
(9) CORR	165	0.36	0.39	−0.44	1.30
(10) GOV_EFF	165	0.64	0.39	−0.36	1.19
(11) POL_STAB	165	0.69	0.31	0.00	1.30
(12) REG_Q	165	0.90	0.31	−0.04	1.70
(13) RULE_LAW	165	0.60	0.41	−0.26	1.37
(14) VOICE_ACC	165	0.83	0.25	0.30	1.20
(15) GOV_EXP	209	18.92	1.95	12.37	25.88
(16) URB	297	62.93	7.59	49.63	75.22
(17) DCPS	256	42.77	20.57	0.19	101.29
(18) TRADE	271	105.27	34.63	39.14	184.55

Source: Authors' computations. Notes: For the definition of variables, please see Table 4.

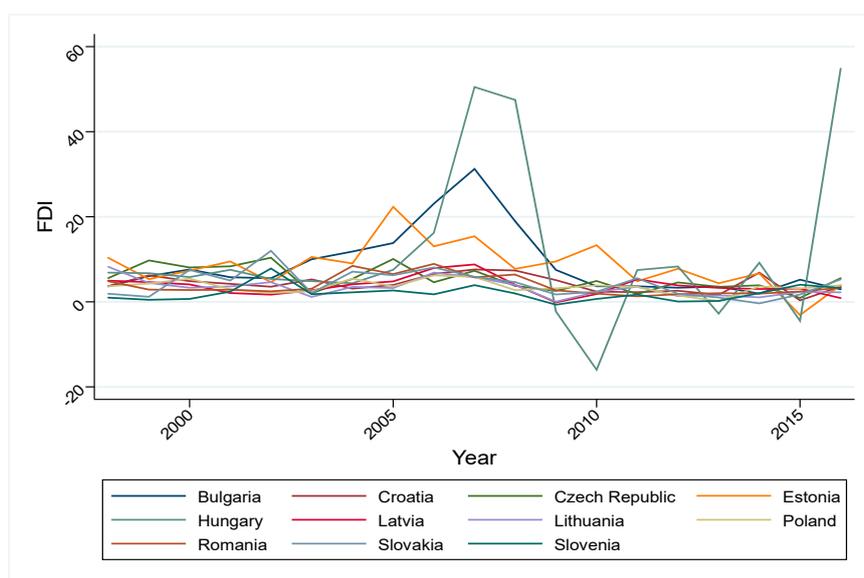


Figure 1. The evolution of FDI in CEECs. Source: Authors' work. Notes: For the definition of variables, please see Table 4.

In line with prior studies [2,4,5,46,55,72,73,112,115,116,118,119], the correlation coefficients of the selected measures are reported in Table 6. We ascertain high level of correlation amid institutional dimensions as in previous studies [2,4,13,23,28]. Therefore, to get rid of the multicollinearity issue, the highly correlated measures will be included in separate regression models.

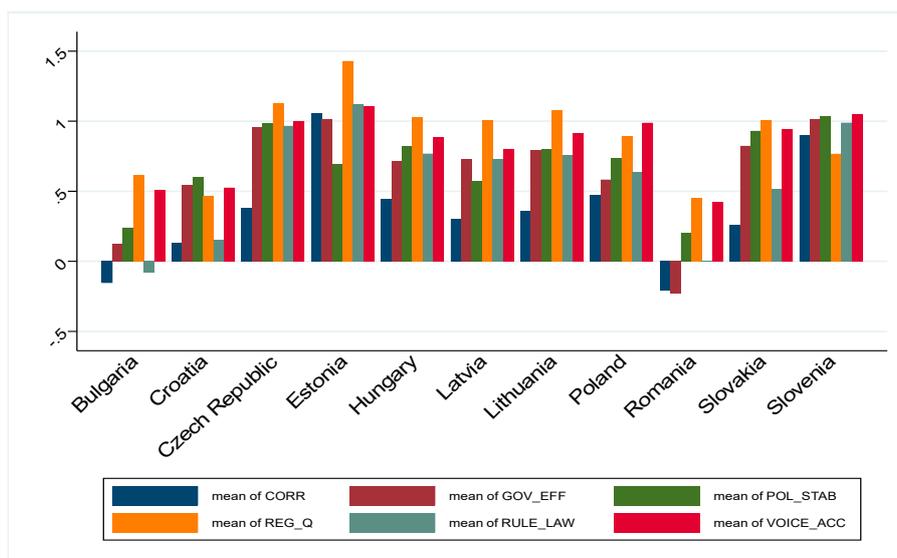


Figure 2. Worldwide Governance Indicators (mean values) in CEECs. Source: Authors' work. Notes: For the definition of variables, please see Table 4.

Table 6. Correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) GROWTH	1								
(2) FDI	-0.11	1							
(3) POV	-0.89***	0.13	1						
(4) INEQ	-0.33***	-0.02	0.74***	1					
(5) EDU	-0.23**	-0.03	0.23*	-0.08	1				
(6) INNOV	0.64***	-0.04	-0.41***	-0.50***	0.40***	1			
(7) TRANSP	0.23***	0.01	-0.23*	-0.46***	0.37***	0.46***	1		
(8) IT	0.83***	-0.04	-0.62***	0.02	-0.27***	0.52***	0.09	1	
(9) CORR	0.61***	-0.01	-0.62***	-0.32***	-0.45***	0.27**	-0.02	0.40***	1
(10) GOV_EFF	0.72***	-0.09	-0.78***	-0.49***	-0.50***	0.24**	-0.05	0.53***	0.80***
(11) POL_STAB	0.55***	-0.08	-0.76***	-0.73***	-0.19*	0.35***	0.18*	0.23**	0.57***
(12) REG_Q	0.42***	0.06	-0.44***	-0.11	-0.32***	0.13	-0.21*	0.42***	0.68***
(13) RULE_LAW	0.72***	-0.03	-0.73***	-0.38***	-0.37***	0.35***	-0.12	0.56***	0.86***
(14) VOICE_ACC	0.53***	-0.05	-0.70***	-0.46***	-0.20*	0.35***	-0.01	0.32***	0.84***
(15) GOV_EXP	-0.06	0.06	-0.50***	-0.56***	-0.16*	-0.01	0.05	-0.16*	0.33***
(16) URB	-0.23***	0.24***	0.18*	0.22**	-0.08	-0.02	-0.21***	0.06	-0.03
(17) DCPS	0.60***	0.03	-0.09	0.13	-0.47***	0.26***	0.03	0.64***	0.34***
(18) TRADE	0.51***	0.14*	-0.48***	-0.34***	-0.46***	0.29***	0.1	0.67***	0.40***
Variables	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(10) GOV_EFF	1								
(11) POL_STAB	0.74***	1							
(12) REG_Q	0.70***	0.46***	1						
(13) RULE_LAW	0.87***	0.65***	0.80***	1					
(14) VOICE_ACC	0.82***	0.73***	0.79***	0.88***	1				
(15) GOV_EXP	0.52***	0.51***	0.32***	0.41***	0.44***	1			
(16) URB	0.12	-0.09	0.44***	0.17*	0.08	0.24***	1		
(17) DCPS	0.34***	0.02	0.22**	0.33***	0.14 [†]	-0.06	0.12 [†]	1	
(18) TRADE	0.57***	0.42***	0.52***	0.53***	0.45***	0.11 [†]	0.18**	0.42***	1

Source: Authors' computations. Notes: Superscripts ***, **, *, and [†] indicate statistical significance at 0.1%, 1%, 5%, and 10% respectively. For the definition of variables, please see Table 4.

4.2. Multivariate Analysis Outcomes

The Hausman test was accomplished for all the estimated econometric models and most of the outcomes support that panel data fixed-effects estimators are consistent than panel data random effects, as in Kayalvizhi and Thenmozhi [28]. However, Zakharov [107] contended that fixed-effects regressions eliminate time-invariant factors typical for each country and comprise time dummies to catch the common time trend.

Table 7 reports the results of estimations concerning the impact of FDI, poverty, and income inequality on growth. The estimated coefficient of FDI is negative in (1), revealing a low statistical

significance, while statistically insignificant in (3). However, in (2) and (4), the coefficient of FDI is also negative, but the coefficient of FDI_SQ is positive, therefore showing a non-linear relationship with GDP per capita. The non-linear relationship between FDI and growth is in line with prior studies [37,66–68]. Furthermore, individuals at risk of poverty or social exclusion show a negative impact on economic growth, in estimations (1) and (2), since poverty act against human capital expansion through restraining the capacity of people to go on healthy and to contribute via talented workforce. On the contrary, estimations (3) and (4) show that income quintile share ratio positively influences economic growth, similar to Fawaz, Rahnama and Valcarcel [30].

Table 7. The outcomes of panel data regression models towards the influence of FDI, poverty, and income inequality on economic growth.

Variables	(1)		(2)		(3)		(4)	
	FE	RE	FE	RE	FE	RE	FE	RE
FDI	−0.00 [†] (−1.78)	−0.00 [†] (−1.90)	−0.01 [*] (−2.08)	−0.01 ^{**} (−3.26)	−0.00 (−0.81)	−0.00 (−0.89)	−0.01 [*] (−2.07)	−0.01 [*] (−2.21)
FDI_SQ			0.00 (1.50)	0.00 ^{**} (2.60)			0.00 [†] (1.90)	0.00 [*] (2.02)
INEQ					0.07 ^{**} (2.88)	0.06 ^{**} (2.68)	0.08 ^{**} (3.21)	0.07 ^{**} (2.98)
POV	−0.02 ^{***} (−10.28)	−0.02 ^{***} (−10.83)	−0.02 ^{***} (−9.82)	−0.03 ^{***} (−15.82)				
GOV_EXP	0.02 (1.57)	0.01 (1.22)	0.01 (1.25)	0.00 (0.22)	−0.01 (−0.36)	−0.01 (−0.39)	−0.01 (−0.77)	−0.01 (−0.66)
URB	−0.02 [†] (−1.76)	−0.01 [*] (−2.52)	−0.03 [*] (−2.03)	−0.01 ^{**} (−3.12)	−0.01 (−0.34)	−0.02 [*] (−2.00)	−0.01 (−0.91)	−0.02 [*] (−2.03)
DCPS	0.00 (0.68)	0.00 (1.26)	0.00 (0.65)	0.00 ^{***} (3.91)	0.01 ^{***} (9.00)	0.01 ^{***} (8.95)	0.01 ^{***} (9.05)	0.01 ^{***} (9.08)
TRADE	0.01 ^{***} (8.53)	0.01 ^{***} (7.83)	0.01 ^{***} (8.04)	0.00 ^{**} (3.06)	0.01 ^{***} (9.19)	0.01 ^{***} (9.88)	0.01 ^{***} (8.26)	0.01 ^{***} (9.10)
_cons	10.31 ^{***} (10.77)	9.80 ^{***} (26.05)	10.63 ^{***} (10.90)	10.03 ^{***} (50.77)	7.57 ^{***} (6.88)	8.36 ^{***} (13.36)	8.37 ^{***} (7.17)	8.58 ^{***} (12.77)
F statistic	49.64 ^{***}		43.37 ^{***}		64.39 ^{***}		56.87 ^{***}	
R-sq. within	0.74	0.73	0.74	0.60	0.76	0.75	0.76	0.76
Hausman test Prob>chi2	0.0266		0.0000		0.0186		0.0945	
Obs.	123.00	123.00	123.00	123.00	142.00	142.00	142.00	142.00
N Countries	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00

Source: Authors' computations. Notes: Superscripts ***, **, *, and † indicate statistical significance at 0.1%, 1%, 5%, and 10% respectively. Figures in brackets show t-statistic. FE denotes fixed-effects (within) regression. RE denotes Random-effects Generalized Least Squares (GLS) regression. For the definition of variables, please see Table 4.

Table 8 presents the estimation outcomes regarding the influence of FDI, education, and innovation on economic growth. The estimation results display the lack of any statistically significant relationship between FDI and growth in all the estimated models. On the other hand, the coefficients of pupils and students, in estimations (1) and (2), alongside the number of patent applications, in estimations (3) and (4), are positive and statistically significant. In fact, educational attainment would catch the absorptive capacity of the economy [46]. This implies that enhanced human capital formation, alongside innovation boost GDP per capita.

The outcomes of panel data regression models towards the impact of FDI, transport infrastructure, and information technology on economic growth are illustrated in Table 9. Analogous to the outcomes from Table 8, there is not found any statistically significant association between FDI and GDP per capita. As well, the coefficients of transport infrastructure in (1) and (2) and information technology in (3) and (4) shows a positive influence on economic growth. Nevertheless, better infrastructure rises the productivity of investment and thus spurs FDI flows [29].

Table 8. The outcomes of panel data regression models towards the influence of FDI, education, and innovation on economic growth.

Variables	(1)		(2)		(3)		(4)	
	FE	RE	FE	RE	FE	RE	FE	RE
FDI	−0.00 (−0.16)	−0.00 (−0.71)	−0.00 (−0.51)	−0.00 (−0.68)	0.00 (0.23)	−0.00 (−0.19)	0.00 (0.07)	−0.00 (−0.30)
FDI_SQ			0.00 (0.50)	0.00 (0.41)			0.00 (0.04)	0.00 (0.27)
EDU	−0.77* (−2.15)	0.03 (0.35)	−0.78* (−2.16)	0.02 (0.16)				
INNOV					0.23*** (7.13)	0.21*** (7.65)	0.23*** (7.08)	0.21*** (7.51)
GOV_EXP	−0.04** (−3.03)	−0.03* (−2.51)	−0.04** (−3.06)	−0.04** (−2.61)	−0.02† (−1.91)	−0.02† (−1.92)	−0.02† (−1.89)	−0.02* (−1.99)
URB	−0.03 (−1.38)	−0.02* (−2.12)	−0.03 (−1.45)	−0.02* (−2.03)	0.01 (0.80)	−0.01 (−1.37)	0.01 (0.78)	−0.01 (−1.13)
DCPS	0.01*** (7.53)	0.01*** (10.25)	0.01*** (7.47)	0.01*** (10.14)	0.01*** (8.06)	0.01*** (9.15)	0.01*** (8.03)	0.01*** (9.03)
TRADE	0.01*** (6.80)	0.01*** (8.60)	0.01*** (6.62)	0.01*** (8.42)	0.01*** (6.28)	0.01*** (7.04)	0.01*** (6.21)	0.01*** (6.86)
_cons	15.49*** (5.34)	9.15*** (9.09)	15.73*** (5.34)	9.36*** (8.48)	6.71*** (6.64)	8.07*** (15.87)	6.72*** (6.47)	8.03*** (14.63)
F statistic	73.42***		62.62***		131.10***		111.67***	
R-sq. within	0.76	0.75	0.76	0.75	0.83	0.83	0.83	0.83
Hausman test Prob>chi2	0.0142		0.0521		0.0100		0.0472	
Obs.	154.00	154.00	154.00	154.00	177.00	177.00	177.00	177.00
N Countries	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00

Source: Authors' computations. Notes: Superscripts ***, **, *, and † indicate statistical significance at 0.1%, 1%, 5%, and 10% respectively. Figures in brackets show t-statistic. FE denotes fixed-effects (within) regression. RE denotes Random-effects Generalized Least Squares (GLS) regression. For the definition of variables, please see Table 4.

Table 9. The outcomes of panel data regression models towards the influence of FDI, transport infrastructure, and information technology on economic growth.

Variables	(1)		(2)		(3)		(4)	
	FE	RE	FE	RE	FE	RE	FE	RE
FDI	−0.00 (−0.82)	−0.00 (−1.22)	−0.00 (−0.70)	−0.01 (−1.13)	−0.00 (−0.01)	−0.00 (−0.08)	−0.00 (−0.00)	0.00 (0.14)
FDI_SQ			0.00 (0.35)	0.00 (0.59)			−0.00 (−0.00)	−0.00 (−0.19)
TRANSP	0.29*** (5.45)	0.12*** (3.60)	0.29*** (5.34)	0.12*** (3.40)				
IT					0.01*** (16.14)	0.01*** (15.96)	0.01*** (15.91)	0.01*** (15.84)
GOV_EXP	−0.06*** (−5.09)	−0.05*** (−4.05)	−0.06*** (−5.08)	−0.05*** (−4.03)	−0.05*** (−5.97)	−0.04*** (−5.44)	−0.05*** (−5.90)	−0.04*** (−5.51)
URB	−0.06*** (−3.74)	−0.02* (−2.33)	−0.06*** (−3.74)	−0.02* (−2.34)	−0.03** (−3.32)	−0.02** (−3.14)	−0.03** (−3.21)	−0.02** (−3.07)
DCPS	0.01*** (9.46)	0.01*** (10.43)	0.01*** (9.43)	0.01*** (10.40)	0.00*** (3.82)	0.00*** (3.97)	0.00*** (3.80)	0.00*** (3.92)
TRADE	0.01*** (9.07)	0.01*** (10.64)	0.01*** (8.88)	0.01*** (10.39)	−0.00 (−0.02)	0.00 (0.46)	−0.00 (−0.01)	0.00 (0.38)
_cons	10.70*** (11.21)	9.00*** (13.85)	10.76*** (11.05)	9.04*** (14.00)	10.95*** (17.83)	10.35*** (20.86)	10.95*** (17.04)	10.42*** (19.60)
F statistic	123.35***		105.21***		306.61***		261.38***	
R-sq. within	0.81	0.80	0.81	0.80	0.91	0.91	0.91	0.91

Table 9. Cont.

Variables	(1)		(2)		(3)		(4)	
	FE	RE	FE	RE	FE	RE	FE	RE
Hausman test Prob>chi2	0.0006		0.0011		0.1073		0.2950	
Obs.	189.00	189.00	189.00	189.00	201.00	201.00	201.00	201.00
N Countries	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00

Source: Authors' computations. Notes: Superscripts ***, **, *, and † indicate statistical significance at 0.1%, 1%, 5%, and 10% respectively. Figures in brackets show t-statistic. FE denotes fixed-effects (within) regression. RE denotes Random-effects Generalized Least Squares (GLS) regression. For the definition of variables, please see Table 4.

Tables 10 and 11 show the estimation outcomes regarding the impact of FDI and institutional quality on economic growth. Similar to Table 7, the results of panel data fixed-effects regression models provide evidence for a non-linear link with economic growth. Furthermore, all the Worldwide Governance Indicators positively influence growth, except political stability and absence of violence/terrorism which is not statistically significant. In case of control of corruption, the “helping hand” viewpoint [18–20] is confirmed. Similar to Kato and Sato [108], the “grease the wheels” hypothesis is established. As well, consistent with Iamsiraroj [46], quality of institutions exerts a critical role in augmenting economic growth directly and through FDI inflows.

Table 10. The outcomes of panel data regression models towards the influence of FDI, control of corruption, government effectiveness, political stability and absence of violence/terrorism on economic growth.

Variables	(1)		(2)		(3)		(4)		(5)		(6)	
	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE
FDI	−0.00 (−1.49)	−0.00 [†] (−1.83)	−0.01* (−2.24)	−0.01** (−3.04)	−0.00 (−0.76)	−0.00 (−1.14)	−0.01 [†] (−1.84)	−0.01** (−2.70)	−0.00 (−1.65)	−0.00 [†] (−1.73)	−0.01* (−2.21)	−0.01* (−2.42)
FDI_SQ			0.00 [†] (1.78)	0.00* (2.50)			0.00 [†] (1.67)	0.00* (2.45)			0.00 [†] (1.68)	0.00 [†] (1.86)
CORR	0.48*** (4.56)	0.38*** (4.40)	0.48*** (4.59)	0.40*** (4.69)								
GOV_EFF					0.54*** (4.55)	0.48*** (5.00)	0.54*** (4.53)	0.50*** (5.12)				
POL_STAB									−0.02 (−0.22)	0.11 (1.20)	−0.03 (−0.29)	0.09 (0.98)
GOV_EXP	−0.03* (−2.42)	−0.04** (−2.70)	−0.04** (−2.73)	−0.04** (−3.16)	−0.03* (−2.21)	−0.04** (−3.25)	−0.04* (−2.51)	−0.05*** (−3.56)	−0.04** (−2.72)	−0.03* (−2.23)	−0.05** (−3.01)	−0.04** (−2.58)
URB	0.03 (1.64)	−0.01 [†] (−1.83)	0.02 (1.18)	−0.01 (−1.61)	0.02 (1.39)	−0.01 [†] (−1.85)	0.02 (0.94)	−0.01 (−1.63)	−0.00 (−0.28)	−0.01 [†] (−1.94)	−0.01 (−0.70)	−0.01 [†] (−1.80)
DCPS	0.01*** (9.10)	0.01*** (8.36)	0.01*** (9.17)	0.01*** (8.64)	0.01*** (8.64)	0.01*** (8.54)	0.01*** (8.70)	0.01*** (8.74)	0.01*** (8.56)	0.01*** (8.36)	0.01*** (8.61)	0.01*** (8.50)
TRADE	0.01*** (8.44)	0.01*** (8.57)	0.01*** (7.65)	0.01*** (7.77)	0.01*** (7.94)	0.01*** (7.58)	0.01*** (7.20)	0.01*** (6.89)	0.01*** (7.83)	0.01*** (8.94)	0.01*** (7.07)	0.01*** (8.19)
_cons	6.46*** (5.48)	8.95*** (20.46)	7.08*** (5.80)	9.09*** (19.59)	6.60*** (5.64)	9.06*** (18.82)	7.20*** (5.92)	9.17*** (17.44)	8.76*** (7.27)	8.95*** (17.86)	9.41*** (7.47)	9.15*** (16.62)
F statistic	62.17***		54.54***		62.11***		54.30***		51.42***		45.02***	
R-sq. within	0.72	0.71	0.72	0.72	0.72	0.71	0.72	0.72	0.68	0.67	0.68	0.68
Hausman test Prob>chi2	0.0000		0.0004		0.0008		0.0121		0.0001		0.0015	
Obs.	163.00	163.00	163.00	163.00	163.00	163.00	163.00	163.00	163.00	163.00	163.00	163.00
N Countries	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00

Source: Authors' computations. Notes: Superscripts ***, **, *, and † indicate statistical significance at 0.1%, 1%, 5%, and 10% respectively. Figures in brackets show t-statistic. FE denotes fixed-effects (within) regression. RE denotes Random-effects Generalized Least Squares (GLS) regression. For the definition of variables, please see Table 4.

With reference to country-level control measures, general government final consumption expenditure negatively influences economic growth. Iamsiraroj [46] claimed that FDI may relocate

domestic saving, whereas Awad and Ragab [42] reinforced for developing states where inland sources of capital are inadequate that private-sector investment may be “crowded out” by higher levels of government spending. Urban population negatively influences economic growth, similar to some extent to Alvarado, Iñiguez and Ponce [69], but contrary to Henderson [33] which claimed that urbanization accelerates growth. Domestic credit to private sector exerts a positive influence on growth similar to Feeny, Iamsiraroj and McGillivray [41]. Trade shows a positive effect on economic growth since openness empowers a more efficient manufacture of goods and services through moving production to nations that have an inclusive benefit [46]. As such, more openness to trade determines a higher FDI influxes, thus showing a positive influence on growth.

Table 11. The outcomes of panel data regression models towards the influence of FDI, regulatory quality, rule of law, voice, and accountability on economic growth.

Variables	1		2		3		4		5		6	
	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE
FDI	−0.00 (−1.24)	−0.00 (−1.62)	−0.01 [†] (−1.68)	−0.01 ^{**} (−2.79)	−0.00 [†] (−1.68)	−0.00 [†] (−1.91)	−0.01 [†] (−1.96)	−0.01 ^{**} (−3.18)	−0.00 (−1.38)	−0.00 [†] (−1.70)	−0.01 [*] (−2.21)	−0.01 ^{**} (−2.91)
FDI_SQ			0.00 (1.29)	0.00 [*] (2.32)			0.00 (1.39)	0.00 ^{**} (2.59)			0.00 [†] (1.79)	0.00 [*] (2.41)
REG_Q	0.88 ^{***} (8.86)	0.65 ^{***} (6.89)	0.87 ^{***} (8.73)	0.68 ^{***} (7.30)								
RULE_LAW					0.87 ^{***} (8.22)	0.67 ^{***} (7.89)	0.86 ^{***} (8.12)	0.67 ^{***} (8.22)				
VOICE_ACC									0.62 ^{**} (3.08)	0.38 ^{**} (2.73)	0.63 ^{**} (3.14)	0.44 ^{**} (3.07)
GOV_EXP	−0.02 (−1.45)	−0.04 ^{**} (−3.02)	−0.02 [†] (−1.69)	−0.04 ^{**} (−3.27)	−0.04 ^{**} (−3.09)	−0.05 ^{***} (−4.12)	−0.04 ^{**} (−3.31)	−0.05 ^{***} (−4.33)	−0.03 [*] (−2.31)	−0.04 ^{**} (−2.87)	−0.04 ^{**} (−2.62)	−0.05 ^{***} (−3.33)
URB	0.03 [*] (2.26)	−0.02 [*] (−2.21)	0.03 [†] (1.83)	−0.02 [*] (−1.98)	0.04 ^{**} (2.62)	−0.01 [*] (−2.52)	0.03 [*] (2.17)	−0.01 ^{**} (−2.86)	0.04 [†] (1.83)	−0.01 (−1.49)	0.03 (1.49)	−0.01 (−1.21)
DCPS	0.01 ^{***} (8.10)	0.01 ^{***} (8.38)	0.01 ^{***} (8.15)	0.01 ^{***} (8.49)	0.01 ^{***} (6.37)	0.01 ^{***} (7.07)	0.01 ^{***} (6.43)	0.01 ^{***} (7.12)	0.01 ^{***} (8.46)	0.01 ^{***} (8.47)	0.01 ^{***} (8.52)	0.01 ^{***} (8.65)
TRADE	0.01 ^{***} (11.92)	0.01 ^{***} (10.55)	0.01 ^{***} (11.03)	0.01 ^{***} (9.95)	0.01 ^{***} (7.65)	0.01 ^{***} (7.16)	0.01 ^{***} (7.03)	0.01 ^{***} (6.39)	0.01 ^{***} (8.75)	0.01 ^{***} (9.03)	0.01 ^{***} (8.02)	0.01 ^{***} (8.23)
_cons	5.15 ^{***} (5.11)	8.74 ^{***} (16.37)	5.59 ^{***} (5.27)	8.79 ^{***} (15.23)	5.89 ^{***} (5.84)	9.40 ^{***} (23.20)	6.36 ^{***} (6.00)	9.59 ^{***} (24.78)	5.35 ^{***} (3.45)	8.73 ^{***} (16.67)	5.95 ^{***} (3.78)	8.82 ^{***} (15.41)
F statistic	92.07 ^{***}		79.51 ^{***}		86.42 ^{***}		74.83 ^{***}		56.32 ^{***}		49.47 ^{***}	
R-sq. within	0.79	0.77	0.79	0.78	0.78	0.76	0.78	0.77	0.70	0.69	0.70	0.70
Hausman testProb>chi2	0.0000		0.0002		0.0000		0.0000		0.0002		0.0062	
Obs.	163.00	163.00	163.00	163.00	163.00	163.00	163.00	163.00	163.00	163.00	163.00	163.00
N Countries	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00

Source: Authors’ computations. Notes: Superscripts ^{***}, ^{**}, ^{*}, and [†] indicate statistical significance at 0.1%, 1%, 5%, and 10% respectively. Figures in brackets show t-statistic. FE denotes fixed-effects (within) regression. RE denotes Random-effects Generalized Least Squares (GLS) regression. For the definition of variables, please see Table 4.

4.3. Causality Analysis

Tables 12 and 13 summarize the panel unit root tests, both for the variables in level and first difference, for types concerning individual intercept, as well as individual intercept and trend, to ensure more robustness. Since all the variables are highly statistically significant at first difference, we notice that all measures are integrated of order one I (1). Thus, we might expect there is a long-run connection between these variables together [109].

Table 14 summarizes the results of panel co-integration examination among the variables using the Pedroni statistics. For the first model, one out of seven Pedroni tests rejects the null hypothesis of no co-integration by means of both the panel and group forms of the Phillips–Perron and ADF tests. Onward, four statistics confirm the co-integration for the second model, three statistics for the third model, two statistics for the fourth model and the sixth models, while six statistics for the fifth model.

Table 12. Unit root checking for variables in level.

Variables	Level								
	Individual Intercept				Individual Intercept and Trend				
	LLC	IPS	ADF	PP	LLC	Breitung	IPS	ADF	PP
(1) GROWTH	−6.89148***	−2.83747**	42.1514**	58.4211***	0.15541	3.17011	3.01311	6.73929	6.39581
(2) FDI	−5.13076***	−4.58253***	60.6361***	56.5393***	−3.87191***	−3.2594***	−3.62251***	50.3541***	56.1099***
(3) POV	−6.30543***	−3.14041***	50.1233***	54.6683***	−6.45945***	−2.33002**	−2.18696*	46.6079**	43.2553**
(4) INEQ	−14.2876***	−5.9795***	68.0805***	73.5803***	−13.3524***	−2.57474**	−5.04005***	67.067***	103.905***
(5) EDU	−14.2876***	−5.9795***	68.0805***	73.5803***	−3.96935***	3.58804	0.23805	26.7064	38.9658*
(6) INNOV	−4.17114***	−0.5406	40.3984**	29.4974	−2.45073**	−1.68113*	−5.10344***	64.2222***	92.981***
(7) TRANSP	0.16593	4.22876	6.54	6.06803	−0.71733	0.48229	0.15573	18.54	17.4855
(8) IT	2.38744	6.07589	2.12261	2.14089	−0.22001	−0.13088	0.75325	15.7589	12.7974
(9) CORR	0.09776	0.63304	18.3063	19.7321	−0.94174	−0.23127	−0.7865	26.3428	33.0795†
(10) GOV_EFF	−2.08343*	−2.51437**	42.9291**	54.336***	−2.83903**	−1.23925	−1.9375*	35.1402*	42.4099**
(11) POL_STAB	−6.14953***	−4.35309***	55.5461***	58.6936***	−2.90664**	−0.53716	−0.39607	22.4669	44.5648**
(12) REG_Q	−1.54727†	0.1684	24.2968	18.8836	−3.49729***	0.06775	−1.13672	25.5891	26.3469
(13) RULE_LAW	−0.63316	0.33652	23.3193	28.4594	−2.75257**	−0.76952	−2.86205**	41.8436**	64.9622***
(14) VOICE_ACC	0.95339	−0.01605	30.1553	20.4843	−2.76689**	1.17876	−1.59179†	31.3506†	26.7416
(15) GOV_EXP	−3.28222***	−3.0214**	45.7265**	46.235**	−4.47912***	−1.52291†	−3.49884***	48.2018**	36.4402*
(16) URB	2.34336	2.73388	19.8265	43.537**	−2.42386**	−3.03075**	0.44016	23.0641	7.86373
(17) DCPS	−3.17298***	−1.36901†	33.1668†	15.3335	2.36018	1.14294	1.30803	10.6243	6.93452
(18) TRADE	−0.57095	1.36231	12.4385	12.6113	−2.17451*	−3.09165**	−2.91162**	43.1445**	37.8771*

Source: Authors' computations. Notes: lag lengths are determined via Schwarz Info Criterion. Superscripts ***, **, * and † indicate statistical significance at 0.1%, 1%, 5% and 10% respectively. LLC reveals Levin, Lin and Chu t^* stat. Breitung reveals Breitung t -stat. IPS reveals Im, Pesaran, and Shin W -stat. ADF reveals Augmented Dickey–Fuller Fisher Chi-square. PP reveals Phillips–Perron Fisher Chi-square. LLC and Breitung assumes common unit root process. IPS, ADF, and PP assumes individual unit root process. Probabilities for ADF and PP are computed using an asymptotic Chi-square distribution. Probabilities for the LLC, Breitung, and IPS tests are computed assuming asymptotic normality. For the definition of variables, please see Table 4.

Table 13. Unit root checking for variables in first difference.

Variables	First Difference								
	Individual Intercept				Individual Intercept and Trend				
	LLC	IPS	ADF	PP	LLC	Breitung	IPS	ADF	PP
(1) Δ GROWTH	−10.0412***	−7.1558***	91.0021***	81.29***	−11.2039***	−6.56351***	−7.06473***	85.2992***	88.9451***
(2) Δ FDI	−12.6609***	−12.4626***	156.28***	452.106***	−9.6859***	−5.18914***	−9.20536***	108.654***	154.953***
(3) Δ POV	−5.32266***	−3.19925***	47.048**	52.9729***	−4.40028***	−1.41804†	−0.20066	24.1753	25.6106
(4) Δ INEQ	−15.3118***	−11.1358***	124.86***	138.282***	−11.078***	−1.97373*	−4.45331***	79.4281***	121.825***
(5) Δ EDU	−2.61974**	−0.87694	30.1715	35.3114*	−3.47777***	−0.0883	−0.39812	29.8188	37.1392*
(6) Δ INNOV	−14.9716***	−16.306**	214.13***	389.426***	−14.4802***	−7.34945***	−17.1801***	210.228***	528.752***
(7) Δ TRANSP	−10.5123***	−10.3428***	127.778***	127.185***	−8.72964***	−8.15695***	−8.93238***	104.849***	114.023***
(8) Δ IT	−5.79754***	−5.57405***	72.5568***	85.062***	−5.04762***	−5.30682***	−3.84183***	53.1043***	59.786***
(9) Δ CORR	−8.05233***	−7.09242***	86.6963***	95.5046***	−5.96343***	−1.90304*	−4.0105***	54.3082***	85.6108***
(10) Δ GOV_EFF	−12.8263***	−10.5067***	123.252***	129.783***	−11.0076***	−4.84495***	−8.46448***	94.4206***	121.1***
(11) Δ POL_STAB	−10.09***	−8.19166***	98.6169***	125.865***	−8.98325***	−3.30695***	−6.80943***	82.317***	146.228***
(12) Δ REG_Q	−8.07981***	−7.17869***	88.8002***	96.2212***	−9.70664***	−2.96341**	−6.76272***	77.9188***	94.6873***
(13) Δ RULE_LAW	−8.40469***	−8.13053***	96.3068***	122.676***	−8.32379***	0.5883	−5.85384***	69.9895***	85.7716***
(14) Δ VOICE_ACC	−9.90439***	−8.19117***	99.3145***	130.447***	−10.1777***	−4.93672***	−7.52055***	84.7466***	123.706***
(15) Δ GOV_EXP	−11.3765***	−9.19058***	113.171***	341.109***	−8.91053***	−7.43709***	−7.01183***	82.334***	114.625***
(16) Δ URB	3.37016	−0.68492	50.8643***	46.8744**	1.10092	−1.93539*	−3.49968***	59.7389***	87.0832***
(17) Δ DCPS	−5.83659***	−6.26303***	81.0564***	84.8147***	−4.11108***	2.08777	−4.16056***	61.1824***	64.09***
(18) Δ TRADE	−12.5416***	−10.9456***	141.017***	166.151***	−10.6513***	−8.69885***	−8.84618***	104.826***	129.987***

Source: Authors' computations. Notes: lag lengths are determined via Schwarz Info Criterion. Superscripts ***, **, * and † indicate statistical significance at 0.1%, 1%, 5% and 10% respectively. LLC reveals Levin, Lin and Chu t^* stat. Breitung reveals Breitung t -stat. IPS reveals Im, Pesaran, and Shin W -stat. ADF reveals Augmented Dickey–Fuller Fisher Chi-square. PP reveals Phillips–Perron Fisher Chi-square. LLC and Breitung assumes common unit root process. IPS, ADF, and PP assumes individual unit root process. Probabilities for ADF and PP are computed using an asymptotic Chi-square distribution. Probabilities for the LLC, Breitung, and IPS tests are computed assuming asymptotic normality. For the definition of variables, please see Table 4.

Table 14. The outcome of Pedroni (Engle Granger-based) panel co-integration test.

Models	Co-integration Test Null Hypothesis: No Co-integration	Individual Intercept		Individual Intercept and Individual Trend		No Intercept or Trend		
		Statistic	Weighted Statistic	Statistic	Weighted Statistic	Statistic	Weighted Statistic	
(1)	GROWTH FDI CORR	Panel v-Statistic	−1.7076	−1.5416	2.558375**	2.358355**	−2.5585	−2.5629
		Panel rho-Statistic	1.7729	1.6675	2.9389	2.5653	0.6379	1.0724
		Panel PP-Statistic	0.8394	0.6747	2.4321	1.5509	−0.0228	0.6954
		Panel ADF-Statistic	−0.1785	−0.2901	0.0185	−0.1417	−0.1750	0.6009
		Group rho-Statistic		3.2381		3.3607		2.0779
		Group PP-Statistic		1.4325		1.2245		0.5920
		Group ADF-Statistic		−0.0656		−0.3940		0.0036
(2)	GROWTH FDI GOV_EFF	Panel v-Statistic	−2.0410	−1.8150	5.601757***	3.009423**	−2.5340	−2.5525
		Panel rho-Statistic	1.6788	1.4922	2.3794	2.1078	−0.0905	0.4903
		Panel PP-Statistic	0.4617	0.3585	1.4419	0.7355	−1.2721	−0.8283
		Panel ADF-Statistic	0.2270	−0.0464	0.7036	0.2789	−1.337236 [†]	−0.8235
		Group rho-Statistic		2.6590		3.1500		0.5467
		Group PP-Statistic		1.0769		1.5894		−2.457101**
		Group ADF-Statistic		0.3420		0.8662		−2.806141**
(3)	GROWTH FDI POL_STAB	Panel v-Statistic	−1.9435	−1.7911	4.109299***	3.148275***	−2.5467	−2.5509
		Panel rho-Statistic	1.6581	1.4842	2.8441	2.5303	0.7844	0.4696
		Panel PP-Statistic	0.8934	0.4409	1.6648	0.8465	0.2732	−0.6228
		Panel ADF-Statistic	0.8873	0.3311	1.3484	0.5390	0.2050	−0.7181
		Group rho-Statistic		2.8741		3.5536		1.1195
		Group PP-Statistic		1.2001		1.5957		−1.88605*
		Group ADF-Statistic		0.9912		0.9094		−2.142891*
(4)	GROWTH FDI REG_Q	Panel v-Statistic	−1.9322	−1.7904	3.827421***	3.100601**	−2.5047	−2.5344
		Panel rho-Statistic	1.7994	1.8637	2.4795	2.2650	0.0694	0.7520
		Panel PP-Statistic	0.4580	0.6717	1.5360	0.8376	−1.295661 [†]	0.0573
		Panel ADF-Statistic	0.4554	0.3683	0.1285	−0.1233	−0.3046	1.0050
		Group rho-Statistic		3.3447		3.4405		0.9909
		Group PP-Statistic		1.6631		1.8083		−1.1041
		Group ADF-Statistic		0.8479		0.7101		−1.1348

Table 14. Cont.

Models	Co-integration Test Null Hypothesis: No Co-integration	Individual Intercept		Individual Intercept and Individual Trend		No Intercept or Trend			
		Statistic	Weighted Statistic	Statistic	Weighted Statistic	Statistic	Weighted Statistic		
(5)	GROWTH FDI RULE_LAW	Panel v-Statistic	−1.2978	−1.0993	1.394589 [†]	1.1297	−2.5529	−2.5564	
		Panel rho-Statistic	0.7354	0.7656	3.1147	2.8597	−1.794843*	−0.9406	
		Panel PP-Statistic	−1.568443 [†]	−1.415265 [†]	2.8852	2.0077	−3.816753***	−3.156792***	
		Panel ADF-Statistic	−1.430085 [†]	−1.2416	2.3909	1.3439	−2.534433**	−2.537426**	
	GROWTH FDI VOICE_ACC	Group rho-Statistic		2.0371		4.1321		0.3189	
		Group PP-Statistic		−1.338549 [†]		2.5739		−3.770538***	
		Group ADF-Statistic		−0.9832		1.6086		−2.018076*	
	(6)	GROWTH FDI VOICE_ACC	Panel v-Statistic	−2.1255	−1.9365	3.894971***	2.947807**	−2.4596	−2.5230
			Panel rho-Statistic	1.6990	1.6716	3.1083	2.9776	1.0982	1.8708
			Panel PP-Statistic	−0.5114	−0.3768	2.7915	2.3235	0.7232	2.1639
Panel ADF-Statistic			−0.3276	0.1174	2.4500	2.1509	0.0742	1.9391	
GROWTH FDI VOICE_ACC		Group rho-Statistic		3.0075		3.9313		1.5779	
		Group PP-Statistic		0.0575		3.0209		−0.5654	
		Group ADF-Statistic		0.9403		2.4051		−2.599532**	

Source: Authors' computations. Notes: Superscripts ***, **, * and † indicate statistical significance at 0.1%, 1%, 5% and 10% respectively. Schwarz Info Criterion was selected for lag length. For the definition of variables, please see Table 4.

Furthermore, to confirm the strength of the outcomes, we apply the Kao test for panel co-integration which is a residuals-based test. Table 15 displays the results of the Kao panel co-integration test. It is obvious that ADF (t-Statistic) is significant, except the sixth model. As such, null hypothesis, specifically there is no co-integration is rejected [109]. Thus, there is a long association between selected measures.

Table 15. The outcome of Kao (Engle Granger-based) panel co-integration test.

Null Hypothesis: No Co-Integration	Models					
	(1) GROWTH FDI ORR	(2) GROWTH FDI GOV_EFF	(3) GROWTH FDI POL_STAB	(4) GROWTH FDI REG_Q	(5) GROWTH FDI RULE_LAW	(6) GROWTH FDI VOICE_ACC
ADF (t-Statistic)	−3.457081***	−3.51358***	−2.678418**	−1.799285*	−2.957034**	−0.688062
Residual Variance	0.010128	0.010301	0.010336	0.009971	0.009585	0.010323
HAC Variance	0.021366	0.022058	0.022258	0.022209	0.016184	0.023863

Source: Authors' computations. Notes: Superscripts ***, **, * and † indicate statistical significance at 0.1%, 1%, 5% and 10% respectively. Schwarz Info Criterion was selected for lag length. For the definition of variables, please see Table 4.

Table 16 reports the results of the Johansen panel co-integration test. For the Johansen panel co-integration test, the suppositions of co-integration tests permit for individual effects, but no individual linear trends in vector autoregression [73]. The null hypothesis of no co-integration is rejected, thus being confirmed the incidence of a long-run association between the variables.

Table 16. The outcome of Fisher (combined Johansen) panel co-integration test.

Models	Hypothesized No. of CE(s)	Fisher Stat. (From Trace Test)	Fisher Stat. (From Max-Eigen Test)
(1)	GROWTH	None	135.8***
	FDI	At most 1	46.99**
	CORR	At most 2	37.73*
(2)	GROWTH	None	126.7***
	FDI	At most 1	49.74***
	GOV_EFF	At most 2	49.92***
(3)	GROWTH	None	124.5***
	FDI	At most 1	50.92***
	POL_STAB	At most 2	53.41***
(4)	GROWTH	None	110.9***
	FDI	At most 1	44.86**
	REG_Q	At most 2	50.2***
(5)	GROWTH	None	102.9***
	FDI	At most 1	44.29**
	RULE_LAW	At most 2	44.31**
(6)	GROWTH	None	100.6***
	FDI	At most 1	61.64***
	VOICE_ACC	At most 2	66.19***

Source: Authors' computations. Notes: Superscripts ***, **, * and † indicate statistical significance at 0.1%, 1%, 5% and 10% respectively. Probabilities are computed using asymptotic Chi-square distribution. For the definition of variables, please see Table 4.

In as much as the variables are cointegrated, the long-run associations are further estimated via FMOLS and DOLS. The outcomes of the FMOLS and DOLS estimated co-integration connections are displayed in Table 17. The FMOLS outcomes of estimations (1), (3), (4) and (6) provide support for an undesirable influence of FDI on growth, contrary to Pegkas [1], Freckleton, Wright and Craigwell [39]. As well, the DOLS results confirm the negative impact merely in the first estimation. With reference to the institutional quality variables, the outcomes are similar to those reported in Tables 10 and 11, but voice and accountability estimate loses its statistical significance.

Table 17. Panel data examination of long-run output elasticities.

Variables	(1)		(2)		(3)		(4)		(5)		(6)	
	FMOLS	DOLS										
FDI	−0.01*	−0.01**	0.00	0.00	−0.01**	−0.01	−0.01†	−0.01	0.00	−0.01	−0.01**	−0.01
	(−2.55)	(−2.77)	(−0.93)	(−0.69)	(−3.28)	(−1.63)	(−1.92)	(−1.21)	(−1.00)	(−0.95)	(−3.16)	(−1.58)
CORR	0.46*	0.35										
	(2.31)	(1.46)										
GOV_EFF			1.05***	0.91**								
			(4.71)	(3.29)								
POL_STAB					−0.30	−0.04						
					(−1.40)	(−0.15)						
REG_Q							0.74***	0.70**				
							(3.61)	(2.73)				
RULE_LAW									1.45***	1.29***		
									(7.49)	(5.99)		
VOICE_ACC											−0.33	−0.08
											(−1.48)	(−0.24)
R-squared	0.63	0.73	0.68	0.74	0.63	0.70	0.67	0.73	0.77	0.82	0.64	0.69
Adjusted R-squared	0.60	0.65	0.65	0.67	0.59	0.61	0.64	0.65	0.75	0.77	0.60	0.61
S.E. of regression	0.28	0.26	0.26	0.25	0.28	0.27	0.26	0.26	0.22	0.21	0.27	0.27
Long-run variance	0.15	0.10	0.13	0.09	0.15	0.12	0.14	0.10	0.09	0.06	0.15	0.12
Mean dependent var	9.14	9.14	9.14	9.14	9.14	9.14	9.14	9.14	9.14	9.14	9.14	9.14
S.D. dependent var	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Sum squared resid	10.76	7.85	9.39	7.48	10.87	8.81	9.73	7.80	6.69	5.23	10.59	8.87

Source: Authors' computations. Notes: Superscripts ***, **, * and † indicate statistical significance at 0.1%, 1%, 5% and 10% respectively. Panel method: Pooled estimation. Heterogeneous variances. Schwarz lag and lead method in case of DOLS estimation. Figures in brackets show t-statistic. For the definition of variables, please see Table 4.

The outcomes of PVECM Granger causalities are reported in Table 18. Therefore, the following causal relationships are identified for each model:

- Model (1): Short-run one-way causal link running from FDI to growth;
- Model (2): One-way causal link running from FDI to growth, along with short-run unidirectional causal link running from government effectiveness to growth;
- Model (3): Short-run one-way causal link running from FDI to growth;
- Model (4): Short-run one-way causal link running from FDI to growth, alongside one-way unidirectional causal link running from growth to regulatory quality;
- Model (5): Short-run one-way causal link running from FDI to growth and one-way unidirectional causal link running from growth to rule of law;
- Model (6): One-way causal link running from FDI to growth, besides short-run unidirectional causal link running from voice and accountability to FDI.

Table 18. Panel vector error-correction model (PVECM) Granger causalities.

Models	Excluded	Short-Run (or Weak) Granger-Causality			Long-Run Granger-Causality
		Dependent Variables			
		Δ GROWTH	Δ FDI	Δ CORR	ECT
(1)	Δ GROWTH		1.6978	2.3258	-0.124502***
	Δ FDI	12.34713**		0.5063	-10.96881***
	Δ CORR	2.8356	3.0597		-0.001809
(2)	Δ GROWTH		1.8875	1.0458	-0.174456***
	Δ FDI	11.45159**		1.1969	-9.440169**
	Δ GOV_EFF	7.444163*	0.4843		0.046016
(3)	Δ GROWTH		2.1091	1.4481	-0.140034***
	Δ FDI	8.041205*		2.8072	-8.335268**
	Δ POL_STAB	0.2664	1.2736		-0.026861
(4)	Δ GROWTH		1.1953	10.78608**	-0.103463***
	Δ FDI	12.49779**		3.7957	-7.632315***
	Δ REG_Q	1.1073	3.1275		0.005832
(5)	Δ GROWTH		1.3339	4.764213 [†]	-0.157890***
	Δ FDI	11.30389**		0.8344	-8.213606**
	Δ RULE_LAW	0.5774	1.6971		-0.001021
(6)	Δ GROWTH		1.7856	2.5089	-0.139026***
	Δ FDI	10.69032**		0.9557	-6.247867*
	Δ VOICE_ACC	3.2408	4.73479 [†]		0.012596

Source: Authors' computations. Notes: Superscripts ***, **, * and [†] indicate statistical significance at 0.1%, 1%, 5% and 10% respectively. ECT reveals the coefficient of the error-correction term. The number of appropriate lags is two according to Schwarz information criterion. For the definition of variables, please see Table 4.

The significance of the ECT is valuable for discussing long-run causality. Therefore, in the long term, we acknowledge a bidirectional causal relationship between FDI and economic growth in all the PVECM models similar to Chan, Hou, Li and Mountain [3], Mahmoodi and Mahmoodi [70], as well as a one-way causal relationship running from each institutional quality indicator to economic growth and FDI.

5. Conclusions and Policy Implications

Foreign direct investment, a crucial factor of globalization, is regarded a noteworthy engine of productivity heightening, technical progress, and job creation. However, reduced institutional quality may discourage FDI inflows. Using panel data for 11 Central and Eastern European countries from 2003 to 2016, current paper examined at first glance the impact of FDI on economic growth, also covering institutional quality measures, as well as several sustainable development goals established in the 2030 Agenda for Sustainable Development [48]. The quantitative outcomes by means of panel data regression models lead us to conclude that a non-linear association occurred between FDI and GDP per capita. In terms of institutional quality, the whole Worldwide Governance Indicators, except political stability and absence of violence/terrorism, exhibited a positive influence on economic growth. Moreover, poverty, income distribution, education, innovation, transport infrastructure and, information technology appeared as significant drivers of growth. The estimations of FMOLS and DOLS confirmed the findings to a partial extent. Furthermore, the panel vector error-correction model Granger causalities provided evidence for a short-run unidirectional causal link running from FDI to growth and a long-run two-way causal connection between FDI and economic growth. Therefore, in

the long run, unidirectional causal associations running from each institutional quality indicator to economic growth and FDI were established.

The outcomes may have some policy implications. Therefore, the policymakers out of the CEECs should attempt to attract higher FDI inflows to boost economic growth. Overall, for the development of an appropriate setting to attract FDI, favorable economic, political, social and cultural conditions are more than required [7], alongside macroeconomic steadiness and the decrease of the market deformations [1]. For instance, the labor force in such countries is quite trained, but modern management and worldwide manufacturing knowledge is regularly missing. Therefore, investors with the required capitals, managerial skills, marketing chain, and industry strength are crucial [35]. First, there should be shaped an economic setting that ensure proper rewards to corporations which would bring ideas from overseas and put them to use with inland funds [81]. As such, financial stimulus in form of labor subventions, energy and property rental discounts, allowance on customs duties for main machinery/raw resources, export credit conveniences or tariff shield are required [22]. Secondly, a sound institutional setting should be implemented. The “helping hand” viewpoint may be explained via the early stages of democracy in the explored region. As such, in line with Harms and Ursprung [101], Mengistu and Adhikary [100] and Sabir, Rafique and Abbas [102], the democracy in the CEECs should be deepened in order to spur the inward flow of FDI [18]. Good governance may create suitable environments for investors, respectively lower cost of doing business, lesser uncertainty and upper productivity expectation [32]. A suitable stage of institutional progress can support synergies between FDI and resident companies, thus enhancing productivity spillovers. Also, capital accumulation may be increased by means of complementarities between foreign and internal investment [38]. Moreover, in line with Jude and Leveuge [38], a better institutional quality may entice high-quality technology. Thirdly, the minority shareholders and creditor rights should be enhanced via capital market directives and banking sector reorganizations, aiming to rise equity or bond release. Thus, a better extension of domestic credit to enterprises should be allowed in the benefit of wealth creation [35]. Similarly, strengthening of trade will also help in appealing FDI. Not least, the policies concerning sustainable development goals should be promoted. In this vein, greenfield and brownfield investments may lessen unemployment, while increasing incomes, public and private consumption, capital accumulation and productivity [89]. As well, infrastructure should be improved to guarantee that FDI which is acquired manifest an increased gain to the entire economy. Accordingly, improved transport systems and modern information technology ease the spread of novel products and technologies [47].

This paper has contributed to the prevailing literature by adding evidence for the case of CEECs on the nexus between FDI and economic growth. Future research can be done to explore the drivers of FDI inflows in CEECs.

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