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Foreign Direct Investment Inflow Dynamics: The Case of Central and Eastern Europe

Kunofiwa Tsaurai https://orcid.org/0000-0001-8041-1181
Ph.D., Full Professor at the University of South Africa, Department of Finance, Risk Management and Banking, Pretoria, South Africa, e-mail: tsaurk@unisa.ac.za or kunofiwa.tsaurai@gmail.com

Abstract

This study investigates the dynamics of foreign direct investment (FDI) inflows into Central and Eastern European countries (CEECs) using panel data (1994–2020) analysis methods such as fixed effects, fully modified ordinary least squares (FMOLS) and random effects. Specifically, the study examined what factors could account for the mixed pattern of FDI inflows into CEECs. The mixed results from the existing empirical literature on FDI inflow dynamics triggered the undertaking of this study to contribute to the ongoing debate on the subject. The study notes that infrastructural development, economic growth and domestic investment had a significant positive influence on FDI across all three panel data analysis methods. Other variables that were found to have had a significant positive effect on FDI include (1) complementarity between infrastructural and financial development (fixed effects, random effects), (2) trade openness (fixed effects) and (3) savings (random effects, FMOLS). A significant negative impact of the exchange rate on FDI was observed under the FMOLS. CEECs are therefore urged to implement policies to increase infrastructural development, financial development, trade openness and savings to enhance the inflow of FDI. Future studies should investigate the minimum threshold levels of the explanatory variables of FDI.

Keywords: foreign direct investment, Central and Eastern Europe, panel data

JEL: C23, C33, F21, N44

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Introduction

The three sub-sections that constitute this part include the background of the study, the contribution to the literature, and the organization of the paper. Foreign direct investment (FDI) brings capital, skills, technology and networking, all of which enhance economic growth in the receiving country (Romer 1986). More recent empirical research that supports the FDI-led growth hypothesis includes, but is not limited to, Gui-Diby (2014), Melnyk, Kubatko, and Pysarenko (2014), Long, Yang, and Zhang (2015) and Okwu, Oseni, and Obiakor (2020). Consistent with Makhoba and Zungu (2021), there appears to be a consensus regarding the positive influence of FDI on economic growth. Despite the overwhelming evidence that economic growth is enhanced by FDI, such information is not enough to help develop policies aimed at attracting FDI. The investigation of the macroeconomic determinants of FDI fills in that gap.

Several empirical studies have attempted to examine the determinants (macro) of FDIs. Table 2 in Section 3 of this paper shows that FDI determinants were found to be varied, mixed, and inconclusive and that there we are still far from a generally agreeable list. The empirical studies also do not agree on how each variable influences FDI, as some show a positive whilst others have a negative impact. Some methodological weaknesses were also observed in the existing empirical research on the determinants of FDI, while others wrongly assumed that FDI and its independent variables are characterized by a linear relationship. The few prior studies that focused on Central and Eastern European countries (CEECs) used outdated data. To the best of the author's knowledge, none investigated the impact of a complementarity variable (trade openness and infrastructural development) on FDI. This study fills these gaps.

The five ways in which this study contributes to literature are enunciated in this section. Firstly, to the best of the author's knowledge, this is the first study to determine if a complementarity variable is one of the determinants of FDI in CEECs. Secondly, unlike prior empirical research on the determinants of FDI, this study used the most recent data (1994–2020). Thirdly, unlike prior research, this study considers that the relationship between FDI and its explanatory variables is non-linear.

Seven more sections constitute the rest of this paper. Section 2 is a theoretical literature discussion on the determinants of FDI, and Section 3 reviews the empirical literature, whilst Section 4 presents and describes the FDI trends for CEECs between 1994 and 2020. Section 5 is the research methodological framework, Section 6 focuses on data analysis and the discussion of the results, while Section 7 concludes.

Theoretical literature review

Table 1. Theoretical praxis of the explanatory variables

Explanatory variables	Theoretical views	Impact
Trade openness (OPEN)	Denisia (2010) argued that trade openness is a direct outcome of good government policy; therefore, it is one of the locational advantages of FDI. It also noted that external shocks experienced by countries characterized by higher levels of trade openness might not be favorable to FDI inflows.	+/-
Economic growth (GROWTH)	The eclectic paradigm hypothesis argued that one of the locational advantages of FDI is economic growth (Denisia 2010), a view supported by Jorgenson (1963).	+
Savings (SAV)	Consistent with Romer (1986) and Lucas (1988), savings stimulate both domestic and foreign investment, ensuring the sustainable and long-term growth of the host country's economy. Domestic savings (% of GDP) was used as a measure of savings in this study.	+
Personal remittances (REMIT)	According to Azam and Haseeb (2021), international capital flows normally follow each other; hence, FDI and personal remittances flow together in the same direction. By contrast, personal remittance inflow enables the labor exporting country to have its own home-grown reservoir of financial resources to stir economic growth, reducing the overreliance on FDI inflows. Either way, personal remittances are expected to influence FDI. Personal remittances received (% of GDP) is the measure of personal remittances used in this study.	+/-
Exchange rate (EXCH)	Aliber (1970) argued that strong domestic currencies chase away FDI because foreign investors get little for their foreign currencies. The argument was supported by Moosa (2010), whose study noted that countries whose currencies are very strong have more appetite to invest in other countries because they can still afford to access capital at higher interest rates and still makes a profit.	+
Financial development (FIN)	According to Kaur, Yadav, and Gautam (2013), developed financial markets ease foreign investors' entry and exit constraints, apart from smoothing foreign and domestic market linkages. Financial markets which are deep and developed enhance the productivity of foreign capital through their ability to efficiently distribute financial resources (Ezeoha and Cattaneo 2012).	+
Domestic investment (DINV)	Consistent with Lucas (1988), the environment that spurs domestic investment is like the one that attracts foreign investment. In other words, increased domestic investment enhances sustainable economic growth, itself a locational advantage of FDI, as argued by Jorgenson (1963). The measure of domestic investment used in this study is gross capital formation (% of GDP).	+
Infrastructural development (INFR)	According to Craigwell (2012), developed infrastructure acts as a support network for the new technology brought in by foreign direct investors. The conducive environment brought by a developed infrastructure attracts foreign direct investors (Denisia 2010).	+

Source: author's compilation.

Empirical literature review

Table 2. Empirical research on the determinants of foreign direct investment

Author	Unit of analysis	Approach	Findings
Tampakoudis et al. (2017)	Middle-income countries	Panel data analysis	The significant positive influence of trade openness, population growth and economic growth on FDI was observed in middle-income countries.
Abel et al. (2021)	Zimbabwe	Autoregressive Distributive Lag (ARDL)	Wages, interest rates, inflation, economic growth and trade openness heavily determined the inflow of FDI into the mining sector of Zimbabwe.
Tocar (2018)	Literature review analysis	Literature review analysis	Salaries, agglomeration, liquidity and market size were factors that positively influenced FDI inflows.
Kumari and Sharma (2017)	Developing countries	Panel data analysis	Trade openness, human capital development, interest rates and market size were noted as the key factors that attracted FDI.
Tsaurai (2017)	BRICS	Fixed effects, pooled OLS	Trade openness, economic growth, exchange rate stability, human capital development and financial development significantly enhanced FDI inflows.
Bryna (2021)	Indonesia	Panel data analysis	Financial development, human capital development, and market size were found to be significant positive factors that drove FDI inflows into Indonesia.
Azam and Haseeb (2021)	BRICS	Fully Modified Ordinary Least Squares (FMOLS)	Trade openness, market size, economic growth and tourism were the major drivers of FDI inflows.
Majavu (2015)	South Africa	Vector Error Correction Model (VECM)	Economic growth enhanced FDI, whilst financial crises had a deleterious influence on FDI in South Africa.
Malefane (2007)	Lesotho	Multi regression analysis	An export-oriented promotion strategy was one of the major factors that attracted FDI into Lesotho.
Boğa (2019)	Sub-Saharan African countries	Panel data analysis	Trade openness, natural resource availability, economic growth, financial development and telecommunication infrastructural development were observed to have attracted FDI into Sub-Saharan African countries.
Wijaya et al. (2020)	Indonesia	VECM	Inflation, economic growth, interest rates, infrastructural development and exchange rates attracted FDI in Indonesia.
Pradhan (2011)	SAARC countries	Vector Autoregressive (VAR) approach	Exchange rate, economic growth, population growth, current account balance, inflation and trade openness were found to be significant positive determinants of FDI.

Author	Unit of analysis	Approach	Findings
Agiomirgianakis, Asteriou, and Papathoma (2004)	OECD countries	Panel data analysis	Human capital development, trade openness and infrastructural development positively influenced FDI.
Coy and Cormican (2014)	Japanese and Ireland	Descriptive statistics	A low corporate rate was found to be instrumental in attracting FDI.
Ashurov et al. (2020)	Central Asian region	Generalized methods of moments	Economic growth, trade openness, previous FDI and tax revenue had a significant influence on FDI.
Mahbub and Jongwanich (2019)	Bangladesh	Time series data analysis	A good regulatory framework, economic growth, political stability and financial development significantly attracted FDI inflows.
Asiedu (2002)	Africa	Panel data analysis	Better infrastructure and a higher rate of return were found to have attracted FDI into non-Sub-Saharan African countries.
Çevis and Çamurdan (2007)	Transition economies	Panel data analysis	Inflation, economic growth, interest rates and trade openness were the major determinants of FDI in transition economies.
Asong, Akpan, and Isiye (2018)	BRICS and MINT countries	Pooled time-series cross-sectional data analysis	Significant factors that attracted FDI into BRICS and MINT countries include infrastructural development, market size and trade openness. Institutional quality and natural resource availability also attracted FDI in an insignificant manner.
Hintosova et al. (2018)	Visegrad group of countries	Pooled ordinary least squares (OLS)	Wages and human capital development were found to have significantly positively influenced FDI.
Erdogan and Unver (2015)	88 countries	Panel data analysis	Human capital development, financial development, market size, inflation, economic growth and unemployment were found to have attracted FDI inflows.
Silveira, Samsonescu, and Triches (2017)	Brazil	VECM	Wages, economic growth and productivity were observed to have attracted FDI in Brazil.
Rashed, Yong, and Soon (2021)	Africa	Panel data analysis	Corruption had a deleterious impact on FDI. On the other hand, economic growth enhanced FDI in Africa.
Mansaray (2017)	Sierra Leone	Error Correction Model (ECM)	Trade openness and economic enhanced FDI inflows in Sierra Leone.
Mupimpila and Okurut (2012)	Southern African Development Community (SADC)	SADC	The lag of inflation and infrastructural development had a deleterious effect on FDI. By contrast, economic growth, external debt, inflation, and the lag of FDI had a significant influence on FDI in SADC countries.

Author	Unit of analysis	Approach	Findings
Mottaleb and Kalirajan (2010)	Developing countries	Panel data analysis	A friendly business environment, economic growth and trade openness had a significant positive influence on FDI in developing countries.
Sane (2016)	Economic Community of West African States (ECOWAS)	Panel data analysis	Economic freedom, economic growth, larger market size, financial development, stable macroeconomic environment and exchange rates played a major role in helping to attract FDI into ECOWAS.
Kariuki (2015)	African Union	Fixed effects model	Trade openness, infrastructural development, commodity price index, financial development, and the lag of FDI had a significant positive effect on FDI in the African Union.
Demirhan and Masca (2008)	Developing countries	Cross-sectional data analysis	Trade openness, economic growth and communication infrastructure were observed to have positively and significantly influenced FDI.
Yunus (2020)	Malaysia manufacturing sector	OLS and descriptive statistics	Whilst high levels of domestic investment lured FDI, human capital development was observed to have had a negative influence on FDI in the manufacturing sector of Malaysia.
Abiola (2019)	Nigeria	VAR approach	Infrastructural development's influence on FDI had a negative effect on FDI in Nigeria. However, a significant positive influence on FDI in Nigeria came from variables such as economic growth, inflation, trade openness and exchange rates.
Piteli (2010)	Developed countries	Panel data analysis	Total factor productivity in the receiving country attracted FDI in a very significant positive manner.

Source: author's compilation.

What is more apparent from these two sections of the literature review is that there is no agreed list that spells out the macroeconomic determinants of FDI, making the study on the determinants of FDI far from conclusive. As a result, there is a need for more empirical research.

Foreign direct investment trends for Central and Eastern European (1994–2020)

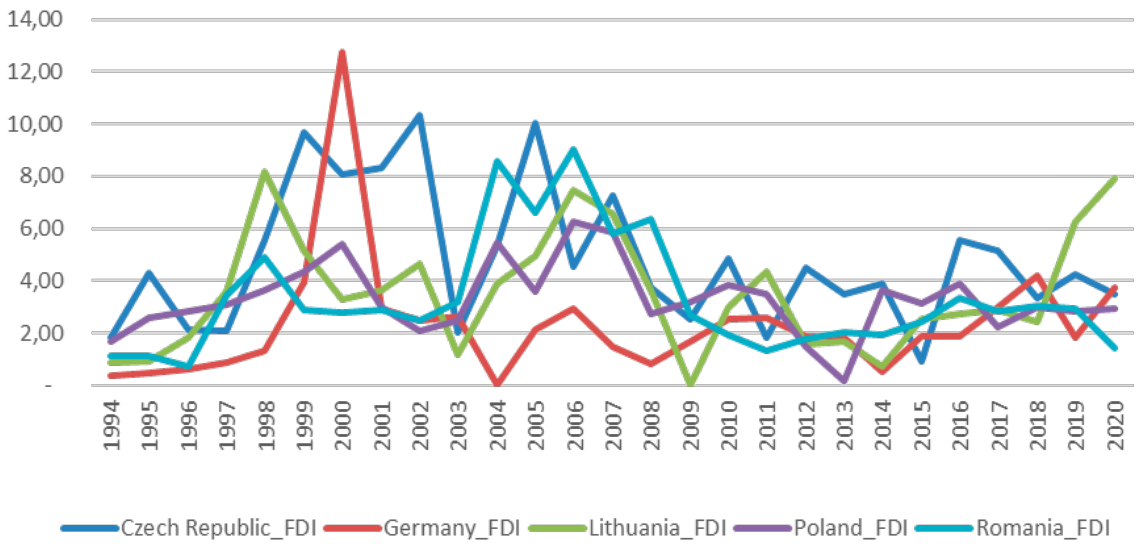

Figure 1. Foreign direct investment net inflows (% of GDP); trends for Central and Eastern European countries

Source: author's compilation.

Net FDI inflows for the Czech Republic increased from 1.84% of GDP in 1994 to 9.69% in 1999, declined by 4.32 percentage points during the four-year period between 1999 and 2004 before further decreasing by 2.82 percentage points, from 5.36% in 2004 to 2.54% in 2009. The period between 2009 and 2014 saw net FDI inflows marginally increasing by 1.32 percentage points, whilst a 0.39 percentage point decline in net FDI inflows was experienced between 2014 and 2020 (from 3.86% in 2014 to 3.47% in 2020).

Germany's net FDI inflows went up by 3.58 percentage points, from 0.34% of GDP in 1994 to 3.92% in 1999, declined by 3.91 percentage points between 1999 and 2004, before experiencing growth of 1.65 percentage points during the subsequent four-year period (from 0.01% of GDP in 2004 to 1.66% in 2009). Germany experienced a 1.16 percentage point decline in net FDI inflows from 2009 to 2014, and then its net FDI inflows jumped from 0.50% of GDP in 2014 to 3.71% in 2020.

The net FDI inflow for Lithuania increased from 0.87% of GDP in 1994 to 5.15% in 1999 before going down by 1.26 percentage points during the subsequent four-year period (from 5.15% of GDP in 1999 to 3.89% in 2004). A further decline of 3.88 percentage points was experienced during the four-year time period between 2004 and 2009. Lithuania's net FDI inflow increased from 0.01% of GDP in 2009 to 0.74% in 2014 before massively increasing by 7.18 percentage points between 2014 and 2020.

Net FDI inflows for Poland went up from 1.69% of GDP in 1994 to 4.36% in 2004, increased by 1.08 percentage points during the subsequent four-year period (1999–2004) before declining from 5.44% in 2004 to 3.19% in 2009. An increase in net FDI inflows of 0.46 percentage points between 2009 and 2014 was observed. Between 2014 and 2020, net FDI inflows plummeted from 3.65% of GDP to 2.91%.

Romania's net FDI inflows went up from 1.13% of GDP in 1994 to 2.90% in 1999, further increased by 5.70 percentage points between 1999 and 2004, before a sharp decline by 5.93 percentage points during the subsequent four-year period (from 8.59% of GDP in 2004 to 2.66% in 2009). Net FDI inflow declined from 2.66% of GDP in 2009 to 1.93% in 2014 before further experiencing a 0.49 percentage point decline between 2014 and 2020).

The net FDI inflows for the five CEECs did not follow a straight line between 1994 and 2020. Thus, several reasons account for the varied nature of the trend lines of net FDI inflows of these countries. The study filled this gap by examining the dynamics behind the mixed trends in net FDI inflows of these CEECs.

Methodological framework

Data: Panel secondary data from 1994 to 2020 was used to examine the determinants of FDI. The World Bank database was the main source of public data. Transparency, accessibility, traceability and reliability are some of the benefits of extracting data from such an international database.

Specification of the general model: Equation 1 represents the general model specification of the FDI function.

$$FDI = f(INFR, FIN, OPEN, EXCH, SAV, REMIT, GROWTH, DINV). \quad (1)$$

The following empirical studies were instrumental in choosing the explanatory variables or independent variables of the FDI function: Agiomirgianakis, Asteriou, and Papathoma (2004), Malefane (2007), Pradhan (2011), Coy and Cormican (2014), Majavu (2015), Kumari and Sharma (2017), Tampakoudis et al. (2017), Tsaurai (2017), Tocar (2018), Boğa (2019), Mahbub and Jongwanich (2019), Ashurov et al. (2020), Wijaya et al. (2020), Abel et al. (2021), Azam and Haseeb (2021), and Bryna (2021). In line with Aye and Edoja (2017), to decisively deal with the multi-collinearity problem, outliers, and abnormally distributed data sets, all the data was used for the main analysis in its natural logarithm format.

Specification of the econometric model: Equation 2 is presented below.

$$FDI = \beta_0 + \beta_1 INFR_{it} + \beta_2 FIN_{it} + \beta_3 (INFR_{it}.FIN_{it}) + \beta_4 OPEN_{it} + \beta_5 EXCH_{it} + \beta_6 SAV_{it} + \beta_7 REMIT_{it} + \beta_7 GROWTH_{it} + \beta_8 DINV_{it} + \mu + \varepsilon. \quad (2)$$

Table 3. Interpretations of econometric signs

β_0	Intercept term
β_0 to β_8	Co-efficient of the independent variables
i	Country
ε	Error term
μ	Time invariant and unobserved country-specific effect
FDIit	FDI net inflows in country i at time t
FINit	Financial development in country i at time t
REMITit	Personal remittances received in country i at time t
OPENit	Trade openness in country i at time t
INFRit	Infrastructural development in country i at time t
GROWTHit	Economic growth in country i at time t
EXCHit	Exchange rate in country i at time t
SAVit	Domestic savings in country i at time t
DINVit	Domestic investment in country i at time t
t	Time

Source: author's compilation.

The impact of the complementarity between infrastructural and financial development on FDI is in line with Dunning (1988). He argued that financial and infrastructural development are locational advantages of FDI. Also consistent with Dunning, when they are both present in the host country in the right proportions, FDI inflow is enhanced. It is for this reason that the complementarity variable as an explanatory variable of FDI was introduced in Equation [2]. FMOLS, random effects and fixed effects are the econometric estimation methods used to estimate Equation [2].

Demirhan and Masca (2008), Mottaleb and Kalirajan (2010), Piteli (2010), Mupimpila and Okurut (2012), Erdogan and Unver (2015), Kariuki (2015), Sane (2016), Mansaray (2017), Silveira, Samsonescu, and Triches (2017), Asong, Akpan, and Isiye (2018) Hintosova et al. (2018) Abiola (2019), Yunus (2020), and Rashed, Yong, and Soon (2021), are some of the few empirical studies that influenced the choice of the measures of the variables employed in this study. Another consideration that played a major role in the selection of the main variables' proxies was data availability.

Table 4. Variables, measures and the sources of data

Variable	Measures used	Data sources
Foreign direct investment (FDI)	Net foreign direct investment inflows (% of GDP)	World Development Indicators
Financial development (FIN)	Domestic credit to the private sector (% of GDP)	World Development Indicators
Remittances (REMIT)	Personal remittances received (% of GDP)	World Development Indicators
Trade openness (OPEN)	Total trade (% of GDP)	World Development Indicators
Infrastructural development (INFR)	Individuals using the internet (% of population)	World Development Indicators
Economic growth (GROWTH)	Gross domestic product per capita	World Development Indicators
Savings (SAV)	Domestic savings (% of GDP)	World Development Indicators
Domestic investment (DINV)	Gross capital formation (% of GDP)	World Development Indicators
Exchange rate (EXCH)	Official exchange rate (LCU per US$, per average)	World Development Indicators

Source: author's compilation.

Presentation, discussion, and interpretation of the results

Pre-estimation diagnostics: The pre-estimation diagnoses covered in this sub-section include correlation analysis, descriptive statistics, panel stationarity tests and panel co-integration tests (see Tables 5, 6, 7 and 8).

Table 5 indicates that the correlation between (1) financial development and FDI and (2) economic growth and FDI is negatively significant. The exchange rate and domestic investment individually had a significant positive relationship with FDI. A non-significant positive correlation was observed between trade openness and FDI, savings and FDI, and personal remittances and FDI. The negative correlation between infrastructural development and FDI was non-significant. Stead (2007) argued that a correlation above 70% (ignoring the sign) shows that there is a problem of multi-collinearity between the variables under consideration. In this case, the multi-collinearity problem exists between financial development and economic growth.

Table 5. Correlation analysis

	FDI	INFR	FIN	OPEN	EXCH	SAV	REMIT	GROWTH	DINV
FDI	1.00								
INFR	−0.13	1.00							
FIN	−0.17**	0.34***	1.00						
OPEN	0.14	0.60***	0.02	1.00					
EXCH	0.35***	−0.09	−0.11	0.37***	1.00				
SAV	0.08	0.44***	0.35***	0.39***	0.64***	1.00			
REMIT	0.02	0.44***	−0.18**	0.55***	−0.13	−0.12	1.00		
GROWTH	−0.23***	0.66***	0.75***	0.13	−0.16*	0.52***	−0.11	1.00	
DINV	0.37***	−0.23***	−0.08	0.10	0.70***	0.49***	−0.14	−0.18**	1.00

***/**/* represents 1%, 5% and 10% significant level respectively.
Source: E-Views.

Table 6. Descriptive statistics

	FDI	INFR	FIN	OPEN	EXCH	SAV	REMIT	GROWTH	DINV
Mean	3.45	43.76	49.76	90.23	7.02	22.55	1.14	15,572.07	23.49
Median	2.93	48.82	48.70	84.64	3.12	22.24	0.61	12,447.44	22.89
Maximum	12.73	89.81	112.42	157.57	38.60	34.82	4.51	48,023.87	36.11
Minimum	0.01	0.03	7.13	37.18	0.17	10.38	0.01	1,323.10	12.66
Standard deviation	2.31	30.96	26.29	31.11	9.64	6.16	1.14	12,743.89	4.35
Skewness	1.33	−0.16	0.55	0.58	1.75	0.05	1.25	1.14	0.55
Kurtosis	5.06	1.48	2.70	2.42	4.70	2.21	3.62	3.41	3.08
Jarque-Bera	63.87	13.58	7.38	9.52	85.34	3.56	37.60	30.33	6.81
Probability	0.00	0.00	0.02	0.00	0.00	0.17	0.00	0.00	0.03
Observations	135	135	135	135	135	135	135	135	135

Source: E-Views.

The range for financial development, trade openness and economic growth exceeds 100, whilst the standard deviation for variables such as economic growth is above 100. Such results indicate outliers in the data set of these variables. Only data for infrastructural development is negatively skewed, whilst the data for the rest of the variables (FDI, financial development, trade openness, savings, exchange rate, economic growth, personal remittances, and domestic investment) is skewed to the right. Except for savings and domestic investment, the other variables' probabilities of the Jarque-Bera criteria equate to zero. Such results mean that the data for most variables do not follow a nor-

mal distribution, consistent with Tsaurai (2021). Following Tsaurai (2020), this study addressed the econometrics problems (data not following a normal distribution pattern, extreme values, multi-collinearity problem) using natural logarithm data for the main data analysis.

Table 7. Panel root tests – Individual intercept

	Level			
	LLC	IPS	ADF	PP
FDI	– 3.91***	– 4.01***	34.40***	53.03***
INFR	– 9.47***	– 9.06***	83.61***	131.50***
FIN	– 0.58	0.28	6.85	5.27
OPEN	– 3.04***	– 0.56	11.15	24.29***
EXCH	– 3.31***	– 1.59*	22.38**	22.34**
SAV	– 0.86	– 0.31	8.82	10.41
REMIT	– 1.26	– 0.16	9.57	8.37
GROWTH	– 1.30*	1.10	3.62	6.60
DINV	– 1.93**	– 2.13**	19.38**	13.25
First difference				
FDI	– 8.53***	– 8.30***	75.19***	110.50***
INFR	– 1.86**	– 4.18**	138***	19.62**
FIN	– 2.98***	– 2.88***	26.05***	41.54***
OPEN	– 5.04***	– 5.45***	47.35***	80.95***
EXCH	– 3.91***	– 3.93***	35.26***	58.51***
SAV	– 5.54***	– 6.72***	60.21***	102.68***
REMIT	– 4.47***	– 4.48***	38.86***	80.50***
GROWTH	– 5.36***	– 4.62***	39.88***	51.77***
DINV	– 8.81***	– 8.41***	75.98***	98.68***

***/**/* represents 1%, 5% and 10% significant level respectively.
Source: E-Views.

This study used Levin, Lin, and Chu (2002), Phillips-Perron-Fisher Chi-Square, Im, Pesaran, and Shin (2003), and the Augmented Dickey-Fuller-Fisher Chi-Square tests as approaches for testing the existence of stationarity. Table 7 shows that not all variables are stationary at level. They are, however, all stationary at first difference, paving the way for the next stage (panel co-integration tests).

Table 8. Johansen Fisher Panel Co-integration test

Hypothesized No. of CE(s)	Fisher Statistic (from trace test)	Probability	Fisher Statistic (from max-eigen test)	Probability
None	6.931	0.7319	6.931	0.7319
At most 1	4.159	0.9399	41.00	0.0000
At most 2	92.10	0.0000	92.10	0.0000
At most 3	239.6	0.0000	127.5	0.0000
At most 4	151.4	0.0000	72.88	0.0000
At most 5	95.77	0.0000	48.94	0.0000
At most 6	57.72	0.0000	34.55	0.0001
At most 7	33.62	0.0002	24.65	0.0061
At most 8	27.36	0.0023	27.36	0.0023

Source: author's compilation from E-Views.

Table 8 indicates that there are, at most, eight co-integrating relationships among the variables, itself evidence that a long-run relationship exists. Consistent with Tsaurai (2021), the existence of a long-run relationship allowed the study to proceed to the next stage (final data analysis).

Main data analysis and discussion of the results: Table 9 presents the main results of the study.

Table 9. Results of final data analysis – The dynamics of foreign direct investment inflows

	Fixed effects		Random effects		Fully Modified Least Squares (FMOLS)	
	Co-efficient	t-statistic	Co-efficient	t-statistic	Co-efficient	t-statistic
INFR	0.21***	2.7973	0.75**	2.1181	0.26**	2.5897
FIN	0.04	0.0898	0.30	1.0108	0.18	0.0372
INFR.FIN	0.38***	3.1793	0.16***	3.3023	0.17	0.1035
OPEN	0.03***	3.4420	0.12	0.5101	0.57	0.7823
EXCH	– 0.44	– 1.5186	– 0.19	– 1.4072	– 0.48*	– 1.6788
SAV	0.05	1.3963	0.21*	1.9050	0.28**	2.1801
REMIT	– 0.03	– 0.2457	– 0.08	– 0.8452	– 0.14	– 1.1320
GROWTH	0.49***	5.3719	0.04***	4.1292	0.61***	3.8172
DINV	0.43***	4.3252	0.18***	3.6916	0.37***	3.6253
Adjusted R-squared 0.5528 F-statistic 19.17 Prob (F-statistic) 0.0000			Adjusted R-squared 0.6317 F-statistic 37.18 Prob (F-statistic) 0.0000		Adjusted R-squared 0.5918 F-statistic 43.19 Prob (F-statistic) 0.0000	

***/**/* represents 1%, 5% and 10% significant level respectively.
Source: E-Views.

Table 9 indicates that infrastructural development had a significant enhancing influence on FDI across all three econometric estimation methods, namely fixed effects, FMOLS, and random effects. These results are in line with Denisia (2010), who noted that FDI is attracted by a conducive investment climate brought by a developed infrastructure.

A non-significant positive influence of financial development on FDI was observed under random effects, FMOLS and fixed effects, consistent with Kaur, Yadav, and Gautam (2013), who argued that developed financial markets are better able to smoothen domestic and foreign markets networks through easing exit and entry challenges of foreign investors.

Fixed and random effects show that the complementarity between infrastructural and financial development significantly enhanced FDI, consistent with Denisia (2010), who indicated that both financial development and developed infrastructure are locational advantages of FDI. The study implied that a combination of more locational advantages of FDI in the host country produces better results. FMOLS also indicated that FDI was positively but non-significantly affected by the complementarity between financial and infrastructural development.

The significant positive impact of trade openness on FDI was observed under the fixed effects approach, whilst random effects and FMOLS produced results showing that FDI was positively but non-significantly affected by openness to trade. These results generally indicate that trade openness enhanced FDI into CEECs, consistent with Denisia's (2010) argument that trade openness is one of the locational advantages of FDI inflows into the host country.

The influence of the exchange rate on FDI under the fixed effects and random effects approaches was negative and non-significant, whilst FMOLS shows a significant negative relationship running from the exchange rate to FDI. These results mean that a depreciation of the local currency reduced FDI inflows into CEECs, in line with Aliber's (1970) argument that a weak domestic currency attracts FDI because foreigners get a higher quantity of domestic currency when they convert their funds.

Random effects and FMOLS show that savings had a significant positive impact on the inflow of FDI, whereas a non-significant positive effect of savings on FDI inflows into CEECs was observed under the fixed effects approach. The results generally align with Lucas (1988), who argued that savings stimulate both domestic and foreign investment, ensuring the sustainable and long-term growth of the host country's economy.

Across all the three panel data analysis methods used, personal remittances had a non-significant reduction impact on FDI, consistent with the argument that personal remittance inflow enables the labor exporting country to have its own home-grown

reservoir of financial resources to stir economic growth, reducing the overreliance on FDI inflows.

The positive impact of economic growth on FDI was found to be significant under the FMOLS, fixed and random effects, consistent with the eclectic paradigm hypothesis, which listed economic growth among a list of locational advantages of FDI (Jorgenson 1963). Domestic investment had a significant positive influence on FDI across all three panel data analysis methods, in support of an argument by Lucas (1988), which implies that the environment that spurs domestic investment is like the one that attracts foreign investment.

Conclusion

This study investigated the dynamics of FDI inflows into CEECs using panel data (1994–2020) analysis methods such as fixed effects, fully modified ordinary least squares and random effects. Specifically, the study examined what factors could account for the mixed pattern of FDI inflows into CEECs. The mixed results from the existing empirical literature on FDI inflow dynamics triggered the undertaking of this study to contribute to the ongoing debate on the subject matter. The study noted that infrastructural development, economic growth and domestic investment had a significant positive influence on FDI across all the three panel data analysis methods. Other variables that had a significant positive effect on FDI include (1) complementarity between infrastructural and financial development (fixed effects, random effects), (2) trade openness (fixed effects) and (3) savings (random effects, FMOLS). A significant negative impact of the exchange rate on FDI was observed under the FMOLS. CEECs are therefore urged to implement policies to increase infrastructural development, financial development, trade openness, and savings to enhance the inflow of FDI. Future studies should investigate the minimum threshold levels of the explanatory variables of FDI.

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Dynamika napływu bezpośrednich inwestycji zagranicznych: przypadek Europy Środkowo-Wschodniej

Opracowanie przedstawia wyniki badania dynamiki napływu bezpośrednich inwestycji zagranicznych (BIZ) do krajów Europy Środkowo-Wschodniej (CEEC) z wykorzystaniem metod analizy danych panelowych (1994–2020), takich jak metoda efektów stałych, w pełni zmodyfikowana metoda najmniejszych kwadratów (FMOLS) i metoda efektów losowych. W szczególności zbadano, jakie czynniki mogą być odpowiedzialne za zróżnicowaną strukturę napływu BIZ do krajów Europy Środkowo-Wschodniej. Różne wyniki prezentowane w istniejącej literaturze empirycznej na temat dynamiki napływu BIZ skłoniły autora do podjęcia się tego badania, aby wnieść wkład w toczącą się debatę. Zauważono, że rozwój infrastruktury, wzrost gospodarczy i inwestycje krajowe miały znaczący pozytywny wpływ na BIZ co potwierdziły wszystkie trzy metody analizy danych panelowych. Inne zmienne, które miały znaczący pozytywny wpływ na BIZ, obejmują (1) komplementarność rozwoju infrastruktury i rozwoju finansowego (metoda efektów stałych, metoda efektów losowych), (2) otwartość handlu (metoda efektów stałych) oraz (3) oszczędności (metoda efektów losowych, FMOLS). Stosując metodę FMOLS zaobserwowano znaczący negatywny wpływ kursu walutowego na BIZ. Zachęca się zatem kraje Europy Środkowo-Wschodniej do wdrożenia polityki mającej na celu zwiększenie rozwoju infrastruktury, rozwoju finansowego, otwartości handlu i oszczędności w celu zwiększenia napływu BIZ. W przyszłych badaniach należy zbadać minimalne poziomy progowe zmiennych objaśniających BIZ.

Słowa kluczowe: bezpośrednie inwestycje zagraniczne, Europa Środkowo-Wschodnia, dane panelowe