

Research Article

Interest Rates and FDI Inflows: Comparative Evidence from Western Balkan versus Central and Eastern EU Countries

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Abstract

This paper investigates the relationship between interest rates and foreign direct investment (FDI) across two groups of countries, the Western Balkans (WB-6) and the Central and Eastern European Union (CE-EU-11), using annual panel data for the period 2000–2023. The analysis employs a fixed-effects model with Driscoll–Kraay standard errors to address cross-sectional dependence, heteroscedasticity, and serial correlation. The findings reveal that the effect of interest rates on FDI differs markedly between the two regions. Higher interest rates are associated with greater FDI inflows in the WB-6 economies but lower inflows in the CE-EU-11 countries. The results underscore the importance of macroeconomic and institutional conditions in attracting foreign investment, with economic growth, inflation, political risk, and government effectiveness identified as key determinants of FDI. Additionally, interest rates exhibit a stronger positive association with FDI during periods of external economic shocks, particularly during the COVID-19 pandemic. Moreover, the negative and statistically significant coefficient of the squared interest-rate term confirms a nonlinear, inverted U-shaped relationship, indicating that moderate increases in interest rates may initially encourage FDI, while further increases beyond a threshold reduce the host economy's attractiveness to foreign investors.

Keywords: Foreign Direct Investment (FDI); Interest Rates; Panel Data; Fixed-Effects Model; Driscoll–Kraay Estimator; Institutional Quality.

INTRODUCTION

Foreign Direct Investment (FDI), have provided substantial advantages to beneficiary economies by inspiring investment, generating employment, and facilitating access to global financial markets. Events such as the Global Financial Crisis, the Eurozone Sovereign Debt Crisis, and the COVID-19 pandemic have led to considerable reductions in

FDI inflows worldwide. In transition economies, FDI signifies a vital source of external financing, supporting technology transfer, the diffusion of managerial knowledge, and deeper integration into the global economy [1, 2]. For Western Balkan countries tracking European Union membership, FDI also contributes to institutional development and convergence with EU [3, 4].

Interest rates as a relatively important determinant of international capital flows is an integral part of classical economic theory. Declining interest rates act as a stimulus for investors to seek profit in emerging economies, for the lenders to borrow at a lower rate and for the international banks to increase euro denomination-based loans which all together enhances financial access and fosters the internationally opening host economy. In addition, slowdowns in the wealthier advanced economies (as of the COVID,19) may further induce the capitol shift to more attractive emerging markets thus substantiating the substitution effect among the [5].

In this context, the present research empirically investigates the nexus between interest rates and FDI as a static panel data model using a fixed effects approach with Driscoll-Kraay standard errors. The paper applies an augmented FDI model that incorporates a set of macroeconomic and institutional variables traditionally believed to influence FDI to observe FDI patterns in CE-EU-11 and WB-6. The study attempts to extend the literature on the identification of FDI determinants in the European region by producing relevant results for academics and policymakers seeking to improve financial stability and effectively control foreign capital inflows in a highly uncertain world of financial globalizations.

More specifically, the study investigates the impact of changes in interest rates on FDI in the developed and transition economies. It empirically tests the effect of long-term interest rates on inward FDI in the CE-EU-11 and WB-6 countries, taking into consideration the most important macroeconomic and institutional determinants. In this respect, the investigation seeks to answer the questions:

1. What is the strength and sign of the effect of the interest rate on FDI in the CE-EU-11 and WB-6 countries?
2. How much of the difference in FDI inflows with respect to fluctuations in interest rates in the CE-EU-11 and WB-6 countries can be accounted for by macroeconomic and institutional variables?
3. How do interest rates influence the behaviour of Foreign Direct Investment (FDI) in the face of significant external shocks such as the Global Financial Crisis, the Eurozone Debt Crisis, and the COVID,19 pandemic?

Based on these research questions, the study examines the following hypotheses:

- H1: Long-term interest rate is expected to affect the inflow of FDI negatively, as would tend to be the case if the higher interest rate is to increase the costs of capital and the demand for investment declines. However, we would expect the magnitude

and even direction of such a relationship to vary between the CE-EU-11 and WB-6 groups of economies.

- H2: The potential impact of macroeconomic variables (GDP growth, openness to trade, foreign exchange reserve, public debt, inflation) and institutional variables (political stability, government effectiveness and regulatory quality) on FDI flows is also assessed [6].
- H3: During major economic crisis episodes, including the Global Financial Crisis, the Eurozone Debt Crisis, and the COVID-19 pandemic, lower interest rates are expected to encourage higher FDI inflows by reducing financing constraints, improving investment conditions, and facilitating international capital mobility [5].

This paper contributes to both academics and policy-making. In terms of academic contribution, this investigation addresses gaps in the current literature by presenting a static panel investigation of FDI determinants between the Western Balkan transition economies and the more advanced CE-EU-11 countries, which also takes into account the effects of crisis periods. Two previous studies of [7, 8] did not yield consistent results in the association among interest rate and FDI for the developing and G7 countries respectively. This study regarding the WB-6 and CE-EU-11 groups by the use of similar methodology and crisis interactions, is rare in the existing literature. Nevertheless, such investigation could, if proven suggestive, provide some empirical evidences for policy making in the development of strategies for FDI attraction, fortification of investment environment and management of foreign capital in both regions.

The remaining of the paper is structured as follows. First, stylized facts on the cyclical behaviour of interest rates and FDI in the WB-6 and CE-EU-11 countries are examined. Second, the empirical literature on the interest rates FDI relationship and the main determinants of foreign investment are reviewed. Third, the data, methodology, econometric framework and the research hypotheses are described. Fourth, the empirical results are shown and analysed. Finally, the main findings are summarized and their policy implications are outlined.

STYLIZED FACTS

Comparative Analysis on the Grounds of Long-Term Interest Rate Trends

During the period from 2000 to 2023, long-term interest rates in the WB-6 countries experienced a sustained downward trend, reflecting improvements in macroeconomic stability, institutional reforms, and gradual convergence toward European financial standards. Despite this progress, interest rates in the WB-6 remained consistently higher than those in the CE-EU-11 countries, underscoring persistent structural differences, higher country risk, and less developed financial markets. Figure 1 presents the evolution of average long-term interest rates in the CE-EU-11 and WB-6 countries, illustrating both the convergence process and the continued interest rate differential between the two groups. Although borrowing costs remained higher in the WB-6 throughout the sample period, the interest rate trends in both regions became increasingly similar, particularly

after 2010, indicating stronger macro-financial convergence and greater policy alignment. By 2015, the WB-6 countries had established a relatively stable low-interest-rate environment, marking a significant improvement compared to the considerably higher interest rates observed at the beginning of the study period.

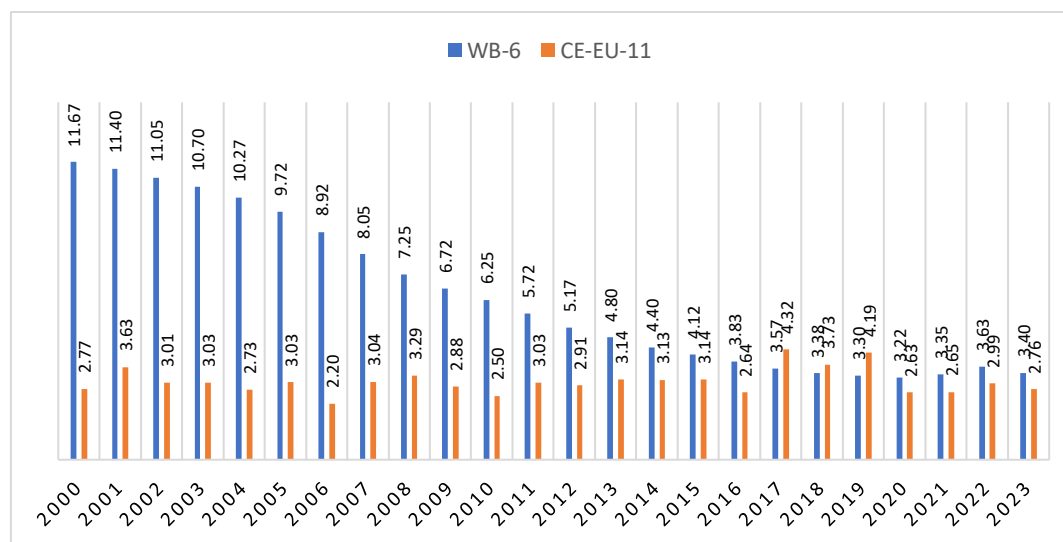


Figure 1. Average long-term interest rates for CE-EU-11 and WB-6 countries

The comparative findings indicate that, although ongoing structural constraints continue to distinguish the interest rate patterns of the WB-6 countries from those of the CE-EU-11, the region has achieved notable progress in aligning with European monetary conditions. This achievement fosters greater financial integration and supports broader economic convergence with the European Union.

Comparative Analysis on the Grounds of FDI Inflows as a Share Of GDP

Figure 2 compares the average FDI inflows, as a proportion of GDP, between the CE-EU-11 and WB-6 states over the period 2000–2023; thus, providing useful evidence on the investment attractiveness, stage of economic development and structural features of these two regional groupings. Between 2000–2023, significant swings in FDI inflows have occurred in these two regions due mainly to worldwide developments, reforms within the respective regions, and in the case of the CE-EU-11 states, their institutional and political stability. CE-EU-11 states had stronger regulatory and institutional regimes and better investor protection mechanisms as well as EU integration advantages while WB-6 states were still in the process of consolidating their institutional and economic foundations for sustained FDI inflows over the long-run. Overall, the CE-EU-11 economies experienced higher levels of FDI inflows accompanied by greater volatility, especially after 2020, driven mainly by multinational enterprise activities, intra-European investment flows, and international financial operations. Conversely, the WB-6 countries recorded lower but comparatively more stable FDI inflows, with investments concentrated primarily in productive sectors such as manufacturing, energy, and infrastructure, indicating a stronger dependence on real-sector investment rather than financial transactions.

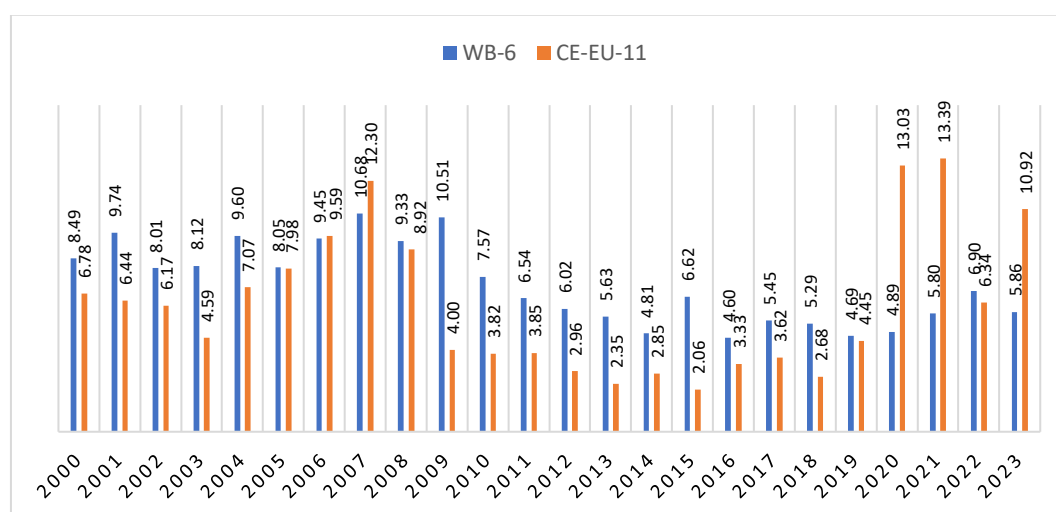


Figure 2. Average FDI inflows as % of GDP in EU vs. WB countries

Although the Western Balkan countries have not yet attained FDI inflow levels comparable to those of EU member states, their relatively stable investment trends indicate a potential path toward economic development and integration. Ongoing structural reforms and further progress in the EU accession process are likely to strengthen the region's appeal to foreign investors and contribute to long-term economic convergence.

LITERATURE REVIEW

The relationship between interest rate and FDI has received much empirical interest. Interest rate plays a key role in affecting the costs of financing, expected rates of return on investment and attractiveness of potential host economies to foreign investors. It is an important factor affecting the inflow of FDI. Generally, low interest rates imply a low cost of borrowing, higher investment activity, and greater access to liquidity which encourages the inflows of capital from abroad. High interest rates can have a positive effect by ensuring macro-economic stability. As suggested by the paradigm of new institutional economics, an efficient way of fostering sustainable financial development is the macro-economic fundamentals and institutional factors determining the inflow of foreign investment, where the interest rate differential as well as political stability are key determinants of international capital transactions [7-11]. An FDI inflows study in G7 and Gulf Cooperation Council (GCC) countries has investigated the influence of real interest rate, real exchange rate and political stability during the period 2005–2019 [7]. The method Panel fully modified ordinary least squares (FMOLS) and Panel DOLS shows that there exists a statistically significant positive long-run relation between real interest rate and FDI inflows [7].

Authors in [7] propose that policy instruments which lead to a decline in lending rates, increased saving and capital accumulation, and/or stimulation of trade activity could help to attract more foreign direct investment (FDI). In opposition to this view, another study, examined by [12] tested the FDI determinants for Norway using location specific

advantages, cointegration analysis and the VAR/VECM framework. The empirical results showed that the interest rate has significantly weakened FDI. This highlights the importance of appropriate macroeconomic policy measures which are capable of lowering the production and transaction costs of the host country, to improve its competitiveness and thereby attractiveness for multinationals. Also, another piece of research examined by [8], tested the impact of interest rates on FDI using panel data set of 17 developing and transition economies for the period 1989–2006 estimated via a fixed effects method. The estimated parameters indicated that interest rate has a positive effect on FDI. This suggests that relatively high-interest rate levels might be associated with better investment opportunities or reward foreign investors for increased macroeconomic risks, providing a higher incentive for capital inflows to the developing countries. In contrast, another research examined by [13], studied the FDI determinants in 20 developing economies from South, East, and South East Asia based on an unbalanced panel data set for 1990–2012 and obtained that a real interest rate exerts a negative influence on FDI flows.

Another study performed by [14], using the Arellano–Bond dynamic panel for 24 emerging economies found that institution related variables, such as rule of law, political stability, regulation quality and corruption, besides infrastructure and lower trade costs, affect inflows of foreign investment. The evidence on interest rate and FDI from the empirical literature is distinct and at times contradictory. Such dissimilarities are due to country specific attributes, institutional environments, development of the financial markets as well as models and estimation methods. The conflicting results suggest that it is important to continue to study this relationship, ideally between transition countries and more advanced countries in Europe. Additional empirical studies investigating the relationship between interest rates, other macroeconomic determinants, and FDI in transition economies are summarized in Table 1.

Table 1. Summary of empirical studies on determinants of FDI

Studies	Study	Sample	Methodology	Findings
[15]	The Effect of Interest Rate, Corruption Perception Index and Economic Growth to Investment in ASEAN-6	ASEAN-6: Indonesia, Malaysia, Singapore, Philippines, Thailand, & Vietnam	Fixed Effect Model (FEM)	The authors concluded that interest rates had a positive and statistically significant influence on FDI inflows.
[10]	Institutional Quality and Foreign Direct Investment: Global Evidence	Global panel consisted of developed, developing, and Asian countries from 2002 to 2019	two-step system GMM model	The findings show that regulatory quality is the only institutional dimension with a significant positive effect on FDI inflows, while the remaining institutional

				quality indicators are negatively associated with FDI in the global panel.
[8]	The effect of macroeconomic and institutional factors on FDI and economic growth: evidence from developing economies	BRICS (Brazil, Russia, India, China and South Africa) and MINT (Mexico, Indonesia, Nigeria & Turkey) countries, covering the period of 1990 to 2017	System generalized method of moments	Beyond macroeconomic conditions, institutional and governance factors also have a significant influence on determining FDI inflows.
[9]	Determinants of inflow of foreign direct investments (FDI) into developing countries	Panel of 53 developing countries from 1996 to 2019	Driscoll and Kraay model and Factor Analysis	Foreign direct investment inflows in developing economies are strongly influenced by institutional quality, particularly political stability and regulatory effectiveness, which foster a more favourable investment climate.
[11]	Effects of the quality of institutions on foreign direct investment inflows in lower-middle income countries	A panel data set of 28 lower-middle income countries over six different regions between the years 2002 and 2018.	System GMM	The results indicate that control of corruption and regulatory quality positively affect FDI inflows, whereas rule of law and voice and accountability are negatively associated with FDI in lower-middle-income economies. Government effectiveness and political stability show no significant effect.

Research Gap

Despite the considerable amount of research examining the relationship between interest rates and Foreign Direct Investment (FDI), significant shortcomings remain in both the empirical evidence and methodological approaches. Previous studies have largely concentrated on advanced economies, including the United States and Eurozone countries,

as well as major emerging markets such as Brazil, India, and China [5, 7, 8, 16]. However, smaller transition economies, particularly those in the Western Balkan region, have received comparatively limited attention [4].

From the methodological viewpoint, most of the empirical literature has used standard econometric procedures such as vector autoregressive (VAR) models, Granger causality tests and classical fixed effects panel models [7, 12]. Although the results from these methodologies are useful, one cannot ignore the importance of financial systems on explaining the pattern of FDI, with common external shocks. As for transition economies, a high sensitivity of foreign capital inflows to external shocks and domestic policy induced shocks is usually observed. A fixed-effects panel estimation with Driscoll–Kraay standard errors has been used to gain reliable results, as it considers the possibility of autocorrelation, cross-sectional and temporal dependence and heteroscedasticity [17]. Nevertheless, although the effect of interest rate movements on FDI inflows has been richly investigated in the world particularly in developed countries related research focusing on transition, and even more on emerging European economies is very limited. In relation to the Western Balkan economies, the evidence is comparatively very scarce, as often country specific empirical papers include only some descriptive statistics. The role of interest rates in the FDI responses to relevant external shocks has been neglected in many empirical studies, meaning both the Western Balkan economies, as well as the more recent EU accession countries from the Central and Eastern European regions, are underrepresented in the related literature, especially in terms of comparative studies over time to check whether the effects of interest rates change during crisis episodes, such as the GFC, the Eurozone debt crisis, or the COVID-19 pandemic.

The purpose of this research is to help fill in the gaps by presenting the first comparative empirical analysis of the impact of interest rates on FDI inflows in the Western Balkan and CEE countries (WB-6 and CE-EU-11 countries). It builds on the theoretical work of [8] and [9] by extending it with the analysis of the interaction of interest rates with the most relevant external crisis events, providing thus a new perspective on the ways external shocks influence the relation of interest rate levels and trends to FDI flows in transition and European Union economies.

METHODOLOGY

This research examines the effect of interest rates on Foreign Direct Investment (FDI) in the WB-6 and CE-EU-11 countries by employing an annual panel dataset spanning the period 2000–2023. In order to consider the role of significant external shocks in shaping FDI movements, the empirical model builds upon the frameworks proposed by [9] and [11] and introduces interaction terms between interest rates and crisis-specific dummy variables. Consequently, the reduced-form FDI specification is designed to assess both the direct influence of interest rates and their varying effects during episodes of external economic disruptions, and is formulated via equation (1):

$$\begin{aligned} \frac{fdi_{it}}{gdp_{it}} = & a_0 + \beta_1(Interest_{it}) + \beta_2(interest_{it}^2) \\ & + \beta_3x + \gamma_t(Interest_{it} \times eu_i) + \gamma_t(Interest_{it} \times crisis_t) + \beta_4z_{it} \\ & + u_i + \lambda_t + \epsilon_{it} \end{aligned} \quad (1)$$

Where fdi_{it}/gdp_{it} represents the dependent variable, measuring inward FDI stock as a proportion of GDP for the selected WB-6 and CE-EU-11 countries. The variable $Interest_{it}$ constitutes the primary variable of interest, reflecting the influence of interest rates on FDI behaviour, while, X_{it} denotes the vector of macroeconomic and institutional control variables included in the empirical framework. The interaction term $(Interest_{it} \times eu_i)$ is employed to examine whether the effect of interest rates on FDI differs between EU member states and Western Balkan economies. The dummy variable $eu = 1$ identifies the CE-EU-11 countries, whereas $eu = 0$, represents the benchmark group consisting of the WB-6 countries. Furthermore, the interaction term $(Interest_{it} \times crisis_t)$ is included to assess whether the relationship between interest rates and FDI changes during periods of major external shocks, such as the Global Financial Crisis, the Eurozone Debt Crisis, and the COVID-19 pandemic. The variable $crisis_t = 1$ denotes years affected by the corresponding crisis events, while, while $crisis_t = 0$, refers to periods characterized by normal economic conditions in the absence of significant external disturbances. x_{it} includes additional macroeconomic determinants of FDI, such as GDP growth, trade openness, foreign exchange reserves, public debt-to-GDP ratio, and inflation. The vector z_{it} incorporates institutional variables that may affect foreign investment decisions, including political risk, government effectiveness, and regulatory quality. Finally, u_i represents the stochastic error term of the model. The extended empirical specification is formulated via equation (2):

$$\begin{aligned} \frac{fdi_{it}}{gdp_{it}} = & a_0 + \beta_1(Interest_{it}) + \beta_2(interest_{it}^2) + \beta_3(growth_{it}) + \beta_4(op_{it}) \\ & + \beta_5(fx_{it}) + \beta_6(gd_{it}) + \beta_7(Inf_{it}) + \gamma_t(Interest_{it} \times eu_i) \\ & + \gamma_t(Interest_{it} \times cv_t) + \gamma_t(Interest_{it} \times fc_t) \\ & + \gamma_t(Interest_{it} \times dc_t) + \beta_8(ps_{it}) + \beta_9(ge_{it}) + \beta_{10}(rq_{it}) \\ & + u_i + \lambda_t + \epsilon_{it} \end{aligned} \quad (2)$$

Where the $i = 1, 2, \dots, n$ denotes the country dimension of the panel dataset, which consists of 17 countries, comprising the six Western Balkan economies (Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia) and eleven Central and Eastern European EU member states (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia). The time dimension is represented by $t = 1, 2, \dots, t$ corresponding to the annual observations covering the period 2000–2023. The empirical framework assumes that FDI inflows in the EU and Western Balkan countries are influenced by a set of macroeconomic and institutional determinants. The explanatory variables incorporated into the model include the interest rate ($interest_{it}$), square value of interest rate ($interest_{it}^2$), Gross Domestic Product gdp_{it} , trade openness to_{it} , foreign exchange reserves fx_{it} , gross domestic debt gd_{it} and inflation inf_{it} . Moreover, the model introduces interaction terms between the primary

variable of interest, the interest rate, and two dummy variables: the EU membership indicator and the crisis-period indicator. The model accounts also for institutional factors that explain FDI, counting for political stability ps_{it} , government effectiveness ge_{it} and regulatory quality rq_{it} .

Econometric Framework

Fixed Effects with Driscoll and Kraay Standard Errors

The Driscoll and Kraay standard errors (DK) provide asymptotically efficient estimates for panel datasets where the time dimension (T) surpasses the cross-sectional dimension (N) [17]. The resulting DK standard errors are robust to heteroscedasticity, autocorrelation, and cross-sectional dependence. The estimation is conducted using the Stata command `xtscc, fe`, incorporating a two-period lag specification to control for temporal correlation.

The Driscoll–Kraay standard errors of the estimated coefficients are derived as the square roots of the diagonal elements of the asymptotic robust covariance matrix, providing more consistent and reliable statistical inference when dealing with complex dependence patterns in panel datasets [17].

$$V(\hat{\theta}) = (X'X)^{-1}\hat{S}_T(X'X)^{-1} \quad (3)$$

Where $\hat{S}_T$ is defined following the approach of Newey and West (1987) [17]. Under this specification, the Driscoll–Kraay covariance matrix estimator can be interpreted as an extension of the heteroscedasticity and autocorrelation consistent (HAC) covariance matrix estimator proposed by Newey and West (1987), applied to the time series of cross-sectional averages. This approach enables the estimator to account for both serial correlation over time and dependence across cross-sectional units, providing robust inference in panel data settings characterized by complex error structures.

Variable Description and Hypotheses Development

The main description of the variables in relation to the hypothesis development are as follows:

- *The dependent variable*, expressed as fdi_{it}/gdp_{it} measures inward Foreign Direct Investment (FDI) inflows relative to GDP. A comprehensive description of all variables, including their measurement units and respective data sources, is provided in the Appendix.
- *The primary variable of interest*, $Interest_{it}$, reflects the long-term interest rate of the CE-EU-11 and WB-6 countries and is used as a measure of the condition of the financial sector and the rate of returns on capital in the host economies. The theoretical implications of the long-term interest rate for FDI are not clear, since it is not clear whether the impact would go up or down depending on the development and maturity of the financial market, institutions and economic conditions of the two country groups.
- *Real GDP growth*, $growth_{it}$ reflects the degree of economic development, market size and growth potential of the host country. A direct benefit of FDI is the technology

spillover, along with the management skills and productivity improvements that go with increased foreign investment. This variable is obtained from the World Bank database. As the economy grows and market opportunity expands, investor confidence in the economic outlook and the stability of policies in the host country is supposed to improve, thus FDI is likely to increase [18]. Therefore, the expected sign is positive.

- *Trade openness* op_{it} , is defined as the ratio of total exports and imports to GDP and is included to measure the degree of trade integration and liberalization in the selected WB-6 and CE-EU-11 economies. The empirical literature generally supports a positive relationship between trade openness and FDI, as greater integration into international markets reduces trade barriers, improves market accessibility, and creates more favourable conditions for foreign investors [17]. Therefore, a positive effect of trade openness on FDI inflows is expected.
- *Foreign exchange reserve*, fx_{it} indicates the foreign money assets accumulated in the holdings of central banks in various countries that facilitate balance of payments stability, aid in exchange rate stabilization and help settle financial payments related to international transactions. The higher foreign exchange reserves a country has, the more stable and resilient the macro economy, financial systems as well as affect investor confidence is said to be. Hence, a positive relation among foreign exchange reserves and FDI inflows is expected.
- *Gross debt as a share of GDP*, denoted as gd_{it} , is introduced into the model to analyze how public indebtedness influences investment conditions. Debt is understood as a means to increase savings accessible for investment and, hence, to boost economic activity by adding funds to domestic savings with external debt. As a consequence, a positive sign is expected, but its magnitude will surely be a function of debt sustainability, fiscal credibility, and overall institutional quality.
- *Inflation rate* inf_{it} is computed as the annual percentage change in average consumer prices, which is an essential macroeconomic control variable. Past empirical literature reports inconsistent results concerning the impact of inflation on FDI, which suggests a negative impact through higher uncertainty and competitiveness, a positive impact under certain growth promoting circumstances, or a nonlinear impact which depends on the situation of the country. Given the diverse macroeconomic conditions among the WB-6 countries, the expected influence of inflation on FDI is ambiguous.
- *Government effectiveness index* gov_{it} captures perceptions regarding the quality of public services, the competence and independence of the civil service, the effectiveness of policy formulation and implementation, and the credibility of government commitments. Stronger government effectiveness is expected to reduce institutional uncertainty, improve the business environment, and increase investor confidence. Therefore, a positive relationship between government effectiveness and FDI inflows is anticipated.

- *Political risk* ps_{it} reflects the probability of political instability, including the risk of government disruption through unconstitutional or irregular means. Since foreign investors are generally sensitive to political uncertainty and institutional instability, higher levels of political risk are expected to discourage FDI inflows, implying a negative relationship between political risk and foreign investment.
- *Regulatory quality* rq_{it} measures the capacity of governments to design and implement policies that promote private sector development, market competition, and business-friendly economic conditions. Improvements in regulatory quality reduce administrative barriers, enhance investment predictability, and support a more favourable investment climate. Therefore, a positive relationship between regulatory quality and FDI inflows is expected.

EMPIRICAL RESULTS

Results from Static Panel Estimates of Fixed Effects

The coefficient of the long-term interest rate becomes statistically significant when interacted with both the country-group dummy variable and the COVID-19 crisis indicator. The empirical results reveal that the effect of long-term interest rates on FDI inflows differs considerably between the two groups of countries. In the CE-EU-11 economies, long-term interest rates have a negative impact on FDI inflows relative to GDP. More specifically, a 10% increase in long-term interest rates is associated with a 1.34% $\{0.955 - (1.129 * 1) = -1.34\}$ reduction in foreign investment inflows. Conversely, in the WB-6 countries, the estimated coefficient indicates a positive relationship, suggesting that a 10% rise in long-term interest rates increases FDI inflows by approximately 9.5% $\{0.955 + (0.909 * 1) = 0.955\}$ on average. The coefficient of the squared interest rate term is statistically significant at the 1% level, confirming that the nonlinear specification contributes additional explanatory power to the model. The negative sign of the quadratic term indicates the presence of an inverted U-shaped relationship between interest rates and FDI. In other words, increases in interest rates initially encourage foreign investment, but after reaching a certain threshold, further increases reduce the attractiveness of the host economy for foreign investors. In contrast to a simple linear relationship, the marginal effect of interest rates in a quadratic model varies depending on the prevailing level of the interest rate.

Moreover, the results demonstrate that the relation between long-term interest rates and FDI became positive and statistically significant during the COVID-19 period. The estimated effect indicates that a 10% rise in the long-term interest rates during COVID,19 period led to an estimated increase of about 10.08 % $\{0.955 + (0.132 * 1) = 1.087\}$ of FDI inflows.

Economic growth demonstrates a positive and statistically significant relationship with FDI inflows. The results indicate that a 1% increase in economic growth leads to an increase of approximately 0.6% in FDI as a share of GDP. Inflation has been found to have a positive effect on foreign investment. A 1% increase in inflation is associated with an average rise

of 0.16% in FDI inflows. This indicates that moderate inflation suggests promising growth prospects, thereby enhancing the attractiveness of host economies for FDI.

The estimated coefficient for political risk is 0.062 and is statistically significant at the 10% level. The relatively small scale of this coefficient suggests that foreign investors display limited sensitivity to variations in political risk indicators. Specifically, a 1% increase in the political risk index is associated with only a marginal 0.062% increase in average bilateral FDI inflows across the WB-6 and CE-EU-11 countries. Moreover, improvements in institutional conditions that support private sector development are found to boost FDI inflows. In particular, a 10% enhancement in regulatory quality increases FDI by approximately 1.7% on average. This result highlights the relevance of institutional reforms aimed to enhance the business environment, which could lead to the increased attractiveness of host economies to foreign investors. Overall, the results recognize several key determinants of FDI in the WB-6 and CE-EU-11 countries. Long-term interest rates exert different effects across the two regions. On one hand, they enhance FDI inflow in the Western Balkan countries, and on the other hand, they deter foreign investment in the CE-EU-11 economies.

The positive interest rate impact on FDI in the WB-6 economies could come from tighter EU approximation process achieved by the region as well as improved macro indicators which could increase investor confidence. While, the CE-EU-11 economies seem to be more vulnerable to reaction of their FDI to changes in interest rates.

During the COVID-19 pandemic, higher long-term interest rates showed considerable positive impact on FDI inflows, indicating that the global pandemic could have altered the classic effect of funding source on FDI decision making process. Apart from the above nexus, the macroeconomic variables economic growth and inflation beyond its reach were also found to be the crucial factors influencing the FDI among the host nations reaffirming the importance of economic growth and macroeconomic stability in luring the foreign capital. Finally, the positive relationship between institutional variables i.e., government effectiveness and regulatory quality as well as an unimpeded effect of the selected institutions (which are indicator of the institutional quality) on the FDI streams underscore the presence of relationship between the institutional quality and FDI [18, 19].

Table 2. Fixed effects results using Driscoll and Kraay's standard errors.

	(1)	(2)
Variables	FEDK	Marginal effects
<i>Interest_{it}</i>	0.955***	
t-stat	(4.374)	
p-value	0.000222	
<i>interest_{it}²</i>	-0.0665***	
t-stat	(-3.004)	
p-value	0.00633	
<i>growth_{it}</i>	0.0645**	
t-stat	(2.201)	
p-value	0.0380	
<i>op_{it}</i>	0.0394	
t-stat	(1.467)	

p-value	0.156	
fx_{it}	0.116	
t-stat	(0.441)	
p-value	0.663	
gd_{it}	-0.0257	
t-stat	(-0.826)	
p-value	0.418	
inf_{it}	0.167*	
t-stat	(1.804)	
p-value	0.0843	
$Interest_{it} \times eu_t$	-1.129***	-1.1286***
t-stat	(-3.475)	(-3.47)
p-value	0.00205	0.001
$Interest_{it} \times cv_t$	0.909***	.90915***
t-stat	(3.922)	(3.92)
p-value	0.000682	0.00
$Interest_{it} \times fc_t$	0.00580	.0057
t-stat	(0.0243)	(0.02)
p-value	0.981	0.981
$Interest_{it} \times dc_t$	0.0242	.0241
t-stat	(0.110)	(0.11)
p-value	0.914	0.913
ps_{it}	0.0629*	
t-stat	(1.728)	
p-value	0.0973	
ge_{it}	0.176**	
t-stat	(2.086)	
p-value	0.0482	
rq_{it}	-0.319	
t-stat	(-1.482)	
p-value	0.152	
a_0	8.409	
t-stat	(1.256)	
p-value	0.222	
Observations	408	
Number of groups	17	

Notes: Dependent variable is FDI inflow as a share of GDP. *t* statistics in parentheses, ***, **, and * indicate the significance of coefficients at 1, 5, and 10 percent, respectively

SUMMARY AND CONCLUSION

This study examines the empirical relationship between interest rates and foreign direct investment (FDI) across different economic settings, including the COVID-19 pandemic, the Global Financial Crisis, and the Eurozone Debt Crisis. It identifies the principal factors influencing FDI inflows in the transition economies of the Western Balkans (WB-6) and the more advanced Central and Eastern European Union (CE-EU-11) countries. By estimating an extended FDI model, the study demonstrates the importance of both macroeconomic conditions and institutional characteristics in explaining regional differences in foreign investment performance.

Using a fixed-effects panel model with Driscoll–Kraay standard errors, the empirical analysis evaluates the relationship between interest rates and FDI while accounting for a comprehensive set of macroeconomic and institutional variables. The findings indicate that macroeconomic conditions remain fundamental determinants of FDI inflows in both regions. Economic growth, inflation, and interest rate movements significantly influence foreign investment decisions, while institutional quality plays a critical role in enhancing the investment attractiveness of host economies. The results further reveal that the impact of interest rates differs across the two regional groups and becomes more pronounced during periods of major external economic shocks. Moreover, the nonlinear specification confirms an inverted U-shaped relationship between interest rates and FDI, suggesting that moderate increases in interest rates may encourage foreign investment, whereas excessively high rates reduce the attractiveness of host economies.

However, in addition to the macroeconomic implications, the result points to the overall importance of FDI in facilitating the productive investment and structural transformation over the longer term. The sectors, specific FDI structure found in the WB-6 countries shows that foreign investment can promote industrial modernization, technology diffusion, energy and infrastructure creation and productivity growth. These sector wise differences reinforce that the quantity and sectoral characteristics of FDI should be equally prioritized, this is especially relevant for transition economies as they aim for a higher industrial competitiveness and sustainable development over the long run.

Furthermore, enhancing macroeconomic stability, developing the quality of institutions, and a stable regulatory framework are other key factors which should be taken into account to promote sustainable FDI inflows. Furthermore, policy measures aimed at promoting investment in tradable sectors with higher long term economic value creation and technological improvement and industrial resilience will help developing countries to achieve the ability of attracting FDI concerned with innovation, competitiveness and sustainability.

As a result of data constraints, the empirical model presented here is not able to consider some of the key determinants of FDI, such as labour costs, availability of natural resources, level of human capital or technology indicators. If they had been included in the analysis, they could perhaps have improved the model as an explanation of investment decisions. In addition, although the present paper demonstrates how FDI may contribute to a country's industrial and technological development, it does not evaluate the impact of FDI on technological innovation and technology intensive investment.

This study adds to the literature by providing a comparative analysis of the direct and indirect effects of interest rates on FDI flows for the WB-6 and CE-EU-11 economies while controlling for the impact of key external shocks, namely the COVID-19 pandemic, the Global Financial Crisis, and the Eurozone Debt Crisis. Additionally, by examining the two separate issues within a holistic empirical framework, the study offers new perspectives on the varying impact of interest rates on FDI flows during different economic development phases. Future research could extend this framework by incorporating

measures of digitalization, innovation capacity, technology-intensive FDI, and industrial competitiveness, together with spatial panel econometric techniques and more recent observations that capture the economic consequences of post-2022 geopolitical developments. Such extensions would provide a deeper understanding of how macroeconomic and institutional conditions influence not only the volume of foreign investment but also its contribution to technological upgrading, industrial transformation, and sustainable economic growth.

AUTHOR CONTRIBUTIONS

"Conceptualization, D.K. and A.B.; Methodology, B.D.; Validation, D.K., R.F. and A.B.; Investigation, B.D.; Resources, D.K.; Data Curation, R.F.; Writing – Original Draft Preparation, D.K.; Writing – Review & Editing, B.D.; Visualization, A.B.; Supervision, B.D.; Project Administration, B.D.

CONFLICT OF INTERESTS

The authors declare that they have no conflicts of interest related to the publication of this article.

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APPENDIX

Table 3. Variable description and data source

Variable	Symbol	Description	Definition
Foreign Direct Investment	fdi_{it}/gdp_{it}	Inward Foreign Direct Investment relative to the size of the host economy	FDI inflow as a share of GDP
Long-term interest rate	$Interest_{it}$	Long-term interest rate reflecting borrowing conditions and financial market development in the host country	Long term interest rate
Economic growth	$growth_{it}$	Real GDP growth capturing market expansion and economic development of the host economy	Growth of GDP
Trade openness	op_{it}	Degree of integration with international markets measured by total trade activity	Trade openness
Foreign exchange reserves	fx_{it}	Foreign currency assets held by central banks reflecting external financial stability	Foreign exchange reserve
Gross domestic debt	gd_{it}	Public debt level capturing the role of external and domestic financing in economic activity	Gross debt as a share of GDP
Inflation	inf_{it}	Change in consumer prices representing macroeconomic stability conditions	Inflation rate
EU membership dummy	eu_i	Dummy variable distinguishing EU member states from Western Balkan countries	$eu_i = 1$ stands for the CE-EU-11 Countries and $eu_i = 0$, captures the benchmark category of the WB-6 countries
Crisis dummy related to COVID-19	cv_t	Dummy variable identifying periods of major external shocks from COVID-19	$cv_t = 1$ stands for the pandemic year of 2020 and $cv_t = 0$ captures the benchmark category of the normal years without pandemic
Financial Crisis dummy	fc_t	Dummy variable identifying periods of major external shocks from financial crisis	$fc_t = 1$ stands for the global financial turmoil year of

Eurozone debt Crisis dummy	dc_t	Dummy variable identifying periods of major external shocks from Eurozone debt crisis	2008 and $fc_t = 0$ is for the rest years $dc_t = 1$ stands for Eurozone debt crisis period, considering the years from 2009 to 2012 and $dc_t = 0$ is the benchmark category of the years without such crisis.
Government effectiveness	ge_{it}	Institutional indicator measuring the quality of public services, policy implementation, and government credibility	Government effectiveness, in percentile rank
Political risk	ps_{it}	Indicator capturing political instability and risks associated with government stability	Political risk, in percentile rank
Regulatory quality	rq_{it}	Institutional indicator measuring the ability of governments to formulate and implement policies supporting private sector development	Regulatory quality, in percentile rank

Source: Authors' calculations based on data obtained from the respective sources indicated in the table.

Table 4. Coefficients from the correlation matrix

	fdi_{it}/gdp_{it}
$Interest_{it}$	-0.10
$interest_{it}^2$	-0.04
$growth_{it}$	0.10*
op_{it}	0.12*
fx_{it}	-0.12*
gd_{it}	0.10*
inf_{it}	0.12*
$Interest_{it} \times eu_i$	-0.20***
$Interest_{it} \times cv_t$	-0.17***
$Interest_{it} \times fc_t$	0.05
$Interest_{it} \times dc_t$	-0.06
ps_{it}	0.06
ge_{it}	0.05
rq_{it}	-0.04
N	408

Note: *t*-statistics are reported in parentheses. Statistical significance is indicated by $p < 0.05$, $p < 0.01$, and $p < 0.001$.

Table 5. Summary results

Variables	N	mean	sd	min	max
fdi_{it}/gdp_{it}	408	6.570	9.185	-3.100	106.4
$Interest_{it}$	408	3.945	4.424	-25.68	17.73
$interest_{it}^2$	408	35.09	51.04	0	659.4
$growth_{it}$	408	7.432	13.16	-72.88	88.49
op_{it}	408	114.3	32.83	22.49	204.1
fx_{it}	408	4.167	2.291	0.116	11.29
gd_{it}	408	42.01	22.58	3.800	213.8
inf_{it}	408	3.596	5.848	-2.419	80.74
eu_i	408	0.647	0.478	0	1
cv_t	408	0.0417	0.200	0	1
fc_t	408	0.0417	0.200	0	1
dc_t	408	0.208	0.407	0	1
t	408	12.50	6.931	1	24
i	408	9	4.905	1	17
$Interest_{it}$	408	2.454	3.316	-10.70	14
$\times eu_i$					
$Interest_{it} \times cv_t$	408	0.0701	0.715	-4.177	8.279
$Interest_{it} \times fc_t$	408	0.173	1.058	-2.799	10.27
$Interest_{it}$	408	1.365	3.062	-1.553	17.73
$\times dc_t$					
ps_{it}	408	59.52	18.36	7.937	93.65
ge_{it}	408	61.02	17.15	11.89	89.62
rq_{it}	408	67.30	15.32	19.02	93.33