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EXCHANGE RATE VOLATILITY AND INWARD FDI: A PANEL DATA ANALYSIS OF BALKAN COUNTRIES

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Abstract *This study investigates the relationship between exchange rate volatility and foreign direct investment (FDI) inflows in Balkan countries, a region known for its political instability and significant economic and institutional challenges. Using secondary data from 2011 to 2021, this study employs a fixed-effects model with a dynamic specification to analyze the impact of exchange rate volatility on FDI, alongside other key determinants such as inflation, crude oil prices and corruption perception index. The results indicate that exchange rate volatility negatively impacts the FDI inflows, while crude oil prices are found to have a significant positive effect. The impact of inflation and corruption perception index is found insignificant in explaining FDI inflows, suggesting that these factors do not substantially influence investment decisions in the Balkan region. These findings contribute to the literature on FDI in the Balkans and provide valuable insights for policymakers and investors. The results suggest that reducing exchange rate volatility could improve the investment climate and enhance the region's attractiveness for foreign investment.*

Keywords: Exchange Rate Volatility, Foreign Direct Investment, Panel Data Analysis, Balkan Countries.

INTRODUCTION

Foreign direct investment (FDI) plays an important role in improving critical sectors such as technology, infrastructure, employment as well as serving as a key indicator of economic growth especially in developing economies. They are crucial for bridging the capital gap in emerging and transition economies, fostering development, and promoting economic diversification (Görg & Greenaway, 2004). On the other hand, developed countries tend to rely less on FDI as a source of economic stimulus due to having more robust financial systems and greater access to domestic sources of funds (Mallampally and Sauvant, 1999).

The attraction of FDI relies on a variety of factors, with exchange rate stability being a significant consideration for foreign investors, particularly in those economies where currencies are volatile. Investors use different risk management strategies to mitigate the uncertainty coming through the exchange rate volatility (Adler and Dumas, 1984). In this context, the investment decision is often influenced by the degree of exchange rate risk, where countries with more stable currencies typically attract higher FDI inflows (Froot and Stein, 1991). As exchange rate volatility increases, so does the risk of potential returns, thus shifting the investments towards markets perceived as less risky (Bénassy-Quéré et al., 2007).

Being characterized by economies in transition, the Balkan countries present an interesting case for examining the relationship between exchange rate volatility and FDI inflows. Over the past few decades, the region has become attractive for investments, particularly in sectors such as services, renewable energy, real estate, oil and gas, and food processing. However, the role of exchange rate volatility in shaping these investment patterns remains underexplored in regional literature.

The objective of this study is to contribute to the existing literature by offering an empirical investigation of how exchange rate fluctuations influence FDI in the region, while controlling for other key factors that may affect investment decisions. Moreover, it aims to provide valuable insights for policymakers and investors to further enhance the region's appeal to foreign investments. Additionally, the findings may provide a valuable reference for future research in international business and economic development. The increasing importance of attracting foreign capital to stimulate economic growth in transition economies further highlights the relevance of this study.

The next section presents a review of existing literature on this topic and provides the theoretical foundation for the study. The methodology section includes econometric modeling and quantifies the relationship between exchange rate volatility and FDI, followed by the empirical results and the conclusion section.

LITERATURE REVIEW

Foreign direct investment (FDI) has long been a focal point of research due to its significant impact on a country's economy, business environment, and financial systems. This study aims to explore how exchange rate fluctuations impact FDI inflows in the Balkan region, accounting also for other explanatory variables. Understanding the factors that influence FDI is crucial, particularly in the context of exchange rate volatility, as it can affect investment decisions. Hanusch et al. (2018) found a negative impact of exchange rate volatility on FDI inflows through a sample of 80 countries including Bulgaria, Romania and Serbia. Benassy-Quéré et al. (2001) used panel data analysis to investigate 42 developing countries for the period from 1984 to 1996. The results highlight the significant role of exchange rate volatility in influencing FDI, demonstrating its negative impact on inflows. Ullah et al (2012) showed similar results for Pakistan from 1980 to 2010. The exchange rate volatility deterred FDI inflows while the currency stability was found to be promoting more inflows in Pakistan. Furthermore, the same findings are confirmed for Nigeria, Iran and South Asian countries (Osinubi & Amaghionyeodiwe, 2009; Sharifi-Renani & Mirfatah, 2012; Azhar et al., 2015). Other authors have used fixed effects models to capture the impact of exchange rate volatility on FDI inflows. Brzozowski (2006) used fixed effects model in 32 developing countries while the same model was applied in Dal Bianco and Loan (2017) across 10 Latin American countries for the period from 1990 to 2012. Both studies suggest that there is a negative relationship between exchange rate volatility and investment inflows, reinforcing the robustness of this correlation across different countries.

Different from the previous studies, Balaban et al. (2019) found mixed results using System-GMM methodology among a group of 16 countries in transition economies. While exchange rate volatility had a negative impact on FDI inflows in the manufacturing industry, quite the opposite was found for the financial intermediation industry. Furceri and Borelli

(2008) investigated 35 EMU countries stating that in countries with a closed economy, exchange rate volatility had a negative influence on FDI, opposite to countries with open economies, where FDI inflows were positively influenced by exchange rate volatility. Surprisingly, Dhakal et al. (2010) found a positive relationship among investment inflows and exchange rate volatility in a group of 6 southeastern Asian countries, where mostly were developing economies. Similar findings are shown in Chowdhury and Wheeler (2008) through a VAR model in 4 developed countries for the period from 1972 to 2005.

Among other variables, inflation was also found to affect FDI inflows. Demirhan and Yilmaz (2015) used RE and FE models in a sample of 7 Balkan countries for two different time intervals. They found a significant negative impact of inflation on FDI inflows in both models. The impact of inflation was found to be insignificant in Kurtovic et al. (2014) which investigated the determinants of FDI in 6 Balkan countries for a period from 1994 to 2012 using fixed effects model. Agudze and Ibhagui (2021) investigated a sample of 74 countries including both industrialized and non-industrialized countries and concluded that inflation had a negative impact in both groups of countries. The same findings are confirmed in a larger sample of 148 countries comprised of low income, middle income, and high-income countries for the period from 1996 to 2016 through a GMM methodology (Sabir et al., 2019). Contrary to the theory and other studies, Jaiblai and Shenai (2019) found a positive impact of inflation on FDI in Sub-Saharan countries using an ARDL approach. Insignificant results about inflation are found in Africa and Eastern Europe (Asiedu, 2002; Rathnayaka et al., 2021).

Another important factor in explaining FDI inflows is corruption given its negative effect due to perceived risk and cost of investment. Skabic and Orlic (2007) found a significant negative impact of corruption on FDI inflows even in the presence of EU membership while investigating a sample comprised of 7 Central European countries and 6 Western Balkan countries for the period from 1993 to 2005. Corruption is found to have a significant negative impact on FDI in the Asian region through a sample of 24 countries for the period from 1980 to 2000 (Mathur & Singh, 2013). Al-Sadig (2009) found this negative relationship in a larger sample of 171 countries during the period of 1984 to 2004. In contrast to studies that report a negative impact, corruption is found to positively affect the FDI inflows in Middle East and North Africa as shown in Helmy (2013) and Sub-Saharan Africa according to Gossel (2018). As noted in these studies, there is a lack of consensus on the effect of corruption on FDI as evidenced in different studies through conflicting conclusions particularly with regards to different regions.

Along with other factors, fluctuations in crude oil prices can influence FDI. The impact may be both positive and negative, depending on the sector and country context. Rogmans and Ebbers (2013) included crude oil prices to determine the FDI inflows in a sample of 16 countries in Middle East and North Africa and found a positive relationship among the said variables. Similar patterns have been identified in a sample of six GCC countries (Eissa and Elgammal, 2020). Unlike this study, Mina (2007) found a negative impact of oil prices in FDI for the GCC countries. Earlier studies such as Gastanaga et al. (1998) have found similar results through a sample of 49 developing countries. Diminishing oil prices have contributed to the slowdown of the FDI inflows in the Balkan region (Marjanovic et al. 2021).

In conclusion, the literature shows strong consensus on the negative impact of exchange

rate volatility on FDI, though some studies, particularly those focused in developed economies or specific industries, present contradictory findings. In addition to exchange rate volatility, considerable research is focused on using inflation, corruption and oil prices to explain the movements in FDI inflows. The evidence is mixed or inconclusive especially regarding the Balkan region. This study aims to address the limited research on the relationship between exchange rate volatility and FDI, with a primary focus on the Balkan countries.

METHODOLOGY

Data and Data Sources

The data sample for this study consists of 7 Balkan countries, including Albania, Bosnia and Herzegovina, Bulgaria, Croatia, North Macedonia, Romania, and Serbia. The data span from 2011 to 2021, providing an optimal sample for analyzing the variables under investigation. Table 1 outlines a short description of the variables including the name, calculation method, abbreviations used in the study and the expected impact of explanatory variables on the dependent variable.

Table 1. *Description of the Variables*

Variables	Proxy	Abbreviation	Expected effect
Foreign Direct Investment	FDI as a % of GDP	FDI	N/A
Exchange Rate Volatility	SD of % change of local currencies to EUR	EXRV	Negative
Inflation	% change among CPIs	INF	Negative
Corruption Perception Index	The corruption index	CORR	Negative
Crude Oil Prices	Historical gasoline prices	COP	Ambiguous

Source: Prepared by the authors.

The calculation method of FDI, which is the dependent variable in this study, involves dividing the total FDI volume by the GDP of each respective country. Exchange rate volatility was measured as the standard deviation of the percentage changes in national currencies` value relative to the Euro. The inflation rate was calculated using the standard method of percentage change on Consumer Price Index (CPI) for consecutive years. The data related to FDI, and inflation were sourced from the World Bank database while the data regarding exchange rate volatility were sourced from investing.com, a financial data platform. The Corruption Perception Index was measured on a scale of 0 (most corrupt) to 100 (least corrupt), obtained from Trading Economies, a global economic and financial platform providing historical data on a wide range of indicators. Given that crude oil price indexes were the only aggregator of the underlying data and the countries in the study were grouped together, historical gasoline prices for each respective country were used as a proxy to represent this variable.

Research Model

This study uses panel data regression analysis with a dynamic specification to assess the impact of exchange rate volatility, along with other explanatory variables such as inflation rate, corruption, and oil prices, on Foreign Direct Investment (FDI). The choice between the random and fixed effects models was made based on the results of the Hausman test. Given the nature of the study, balanced panel data with no missing observation were selected for the analysis. Some preliminary tests were conducted to ensure the stationarity of the data and the robustness of the model.

One of the key considerations when employing panel data models is the stationarity of the variables. The unit root hypothesis states that variables should be stationary, meaning they do not exhibit persistent trending patterns. When variables have a unit root, it becomes difficult to accurately capture their isolated impact leading to unreliable and spurious results. The stationarity of the variables in this study was assessed using Philips-Perron Fisher unit root test. The null hypothesis assumes the presence of a unit root while the alternative hypothesis is in favor of stationarity. As shown in Table 2, the unit root test results suggest the rejection of the null hypothesis indicating the I(0) stationarity of the variables at 5% significance level.

Table 2. *Unit Root Test Summary (Stationarity)*

Phillips-Perron Fisher Unit Root Test		
	t-Stat	**Prob.***
FDI	49.9461	0.0000*
EXRV	39.5809	0.0003*
INF	38.4422	0.0004*
CORR	53.9646	0.0000*
COP	24.4991	0.0398*

**Rejects the null hypothesis at 5% significance level.*

Source: Generated by the authors using E-Views.

Another important assumption is the absence of a perfect correlation among the explanatory variables. Multicollinearity analysis was conducted to verify the degree of correlation among the independent variables. A correlation coefficient above 0.8 indicates a high correlation, suggesting the removal of one of the variables, thus avoiding spurious results. As shown in Table 3, the correlation coefficients among the dependent variables in this study are all below 0.8 supporting the inclusion of all variables in the model.

Table 3. *Multicollinearity Analysis*

Correlation Matrix				
	EXRV	INF	CORR	COP
EXRV	1			
INF	0.4592	1		
CORR	-0.0621	-0.2078	1	
COP	0.3974	0.3828	-0.1198	1

Source: Generated by the authors using E-Views.

In addition to multi-collinearity assumption, the expected value of the error terms needs to be zero given the explanatory variables. The violation of the zero conditional mean assumption results in an endogeneity problem, leading to biased and inefficient estimation of coefficients. The results presented in Table 4 show that the residuals mean is close to zero, satisfying the zero conditional mean assumption, which is essential for the model validity.

Table 4. *Zero Conditional Mean Assumption*

	Residuals Mean
EXRV	1.62E-15
INF	1.64E-15
CORR	1.17E-15
COP	3.14E-15

Source: Generated by the authors using E-Views.

After ensuring that the regressors are not correlated with the error terms, it is important to verify that the error terms exhibit homoscedasticity. The presence of heteroskedasticity can lead to inefficient estimators and biased statistical inferences. The assumption of homoskedasticity was examined using the Breusch-Pagan test. The null hypothesis assumes homoscedasticity while the alternative hypothesis is in favor of heteroscedasticity. Referring to the F-statistic from the Breusch-Pagan test results in Table 5, the null hypothesis was not rejected at 5% significance level, implying that the variance of the error terms is constant.

Table 5. *Heteroskedasticity Assumption Test*

Dependent Variable: RESID01^2
Method: Least Squares

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
CORR	-1.16E-05	1.08E-05	-1.0682	0.2894
EXRV	-0.0077	0.0120	-0.6361	0.5270
COP	-7.63E-05	0.0004	-0.1862	0.8529
INF	-0.0030	0.0030	-0.9705	0.3354
C	0.0010	0.0007	1.4592	0.1494
EXRV (-1)	0.0021	0.0111	0.1903	0.8497
R-squared	0.0513	Adjusted R-squared		-0.0228
F-statistic	0.6925	Prob (F-statistic)		0.6309

Source: Generated by the authors using E-Views.

Regarding the normality of the error terms, given that the sample size exceeds 30 observations, the Central Limit Theorem ensures the approximation of normality in the sampling distribution of the estimators. Furthermore, autocorrelation robust standard errors were employed in the final estimation of the regression equation to account for potential serial correlation in the error terms. After ensuring that all the relevant assumptions were fulfilled, it was important to determine whether a random effects or fixed effects model was more appropriate. Hausman test was used to determine whether the unique error terms had a correlation with the explanatory variables.

Table 6. *Hausman Test*

Correlated Random Effects - Hausman Test			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	101.7000	5.0000	0.0000

Source: Generated by the authors using E-Views.

The null hypothesis in the Hausman test states the appropriateness of the random effects model while the alternative hypothesis suggests the fixed effects model. The test statistics presented in Table 6 suggest the rejection of the null hypothesis at 5% significance level. This implies that the fixed effects model is more appropriate given the presence of a correlation among individual effects and the regressors.

EMPIRICAL RESULTS

This section presents the empirical results of this study, showing the significance of the impact of exchange rate volatility, inflation rate, corruption index, and oil prices on FDI inflows in the Balkan countries. After the fulfillment of all the relevant assumptions, a panel data fixed effects model was employed to analyze this relationship. The equation below represents the model specification of the regression equation.

$$FDI_{i,t} = a + \beta_1 EXRV_{i,t} + \beta_2 INF_{i,t} + \beta_3 CORR_{i,t} + \beta_4 COP_{i,t} + \beta_5 EXRV_{i,t-1} + u \quad (1)$$

Where: (α) stands for the constant term of the regression, (i) stands for the country, (t) stands for period, and (u) stands for the serially uncorrelated error term.

Estimation Output

The empirical results derived from the panel least squares model are summarized in Table 7. The estimation output presents the model fit and diagnostic statistics, outlining the relationship between FDI inflows and exchange rate volatility, inflation rate, corruption index, and oil prices in the Balkan countries.

Table 7. *Estimation Output*

Dependent Variable: FDI				
Method: Panel Least Squares				
Sample (adjusted): 2012 2021				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.0267	0.0401	0.6645	0.5090
EXRV*	-0.6956	0.2706	-2.5698	0.0128
INF	0.0353	0.0548	0.6448	0.5216
CORR	-0.0003	0.0008	-0.3951	0.6942
COP*	0.0323	0.0147	2.1908	0.0325
EXRV (-1) *	-1.4131	0.2617	-5.3982	0.0000
R-squared	0.7885	Adjusted R-squared		0.7484
F-statistic	19.6595	Prob(F-statistic)		0.0000

** Significant at 5% significance level*
Source: Generated by the authors using E-Views.

The regression results displayed in Table 7 suggest that exchange rate volatility and oil prices are statistically significant in explaining the variations in FDI inflows. A significant negative relationship is observed among exchange rate volatility and its first lag with respect to FDI inflows. Similar findings were observed in Benassy-Quéré et al. (2001), Brzozowski (2006), and Hanusch et al. (2018). While literature generally suggests a negative relationship among oil prices and FDI, some studies report a positive relationship. This study reveals a positive relationship between oil prices and FDI. These findings are in line with those of Marjanovic et al. (2021), who suggest a slowdown in FDI inflows due to decreasing oil prices in the Balkan countries. In contrast to exchange rate volatility and oil prices, inflation rate and corruption were found to be statistically insignificant in explaining the FDI inflows in this study. In line with this results, Kurtovic et. al. (2014) also found inflation to be insignificant for the Balkan countries. Following this results, the significance of the overall model is examined, demonstrating the reliability of the factors influencing FDI in the region. The adjusted R-squared statistics show the explanatory power of the model indicating that 75 percent of the variation in the FDI inflows is explained by the movements in the explanatory variables. This is further supported by the F-statistic value showing the significance of the model in explaining the variations in FDI inflows.

CONCLUSIONS

The main aim of this study was to investigate the relationship between exchange rate volatility and FDI inflows with a particular focus in the Balkan countries. Other control variables such as inflation rate, corruption, and oil prices, were used alongside the exchange rate volatility to explain the movements in FDI inflows. The empirical results from the panel data regression analysis indicate a significant negative relationship between exchange rate volatility and FDI inflows in the Balkan countries. The findings align with most of the literature reviewed in this study, confirming the importance of currency stability in attracting FDI. Fluctuations in the oil prices, on the other hand, were found to have a positive relationship with FDI inflows. However, literature presents mixed results regarding this relationship, and the positive relationship is particularly evident when FDI targets the energy or oil sector. Unlike the other variables, inflation rate and corruption were found to be statistically insignificant in explaining FDI movements. Kurtovic et. al. (2014) also found inflation to be insignificant in the Balkan countries, suggesting that this relationship has remained consistent over time.

While this study provides valuable contributions to the existing literature, it also has limitations. The data used in the analysis is limited to a specific time period and may not fully capture the long-term dynamics of FDI. Future studies could expand the analysis by incorporating additional variables, exploring cross-country comparisons, or applying alternative methodologies, to better understand the complexities of FDI inflows.

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