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The relationship between Foreign Direct Investment, trade openness, exchange rate, and Gross Domestic Product per capita in Vietnam

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Abstract

Aim/purpose – This study explores the nexus between Foreign Direct Investment (FDI), trade openness, exchange rate, and Gross Domestic Product (GDP) per capita in Vietnam between 1986 and 2020.

Design/methodology/approach – The Vector Error Correction Model (VECM) was used to evaluate the nexus between FDI, trade openness, exchange rate, and GDP per capita in Vietnam between 1986 and 2020. Moreover, the Johansen co-integration test examined the long-run relationship among these variables.

Findings – Results address that GDP per capita, FDI, and trade openness may generate an appreciation of the Vietnamese currency in the short run. In the long run, we found that FDI inflows and trade openness support GDP per capita, but the depreciation of Vietnam Dong harms the economic growth of this country in the long run. The Johansen co-integration test confirmed a long-run association among GDP per capita, FDI inflows, trade openness, and exchange rate. Results also indicated a unidirectional causality running from GDP per capita and trade openness to FDI and exchange rate. In addition, a bidirectional causality ran from FDI to the exchange rate.

Research implications/limitations – Policies were recommended to facilitate macroeconomic stability for Vietnam. First, fiscal and monetary policies should be carried out to achieve targets in macroeconomic stability, economic development, employment

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creation, and inflation control. Second, FDI inflows should continue to be encouraged since they accelerate economic growth. Still, FDI projects should concentrate on improving labor skills and technological progress and promoting sustainable development in crucial sectors such as agriculture, energy, and the environment. Third, fostering innovation in exports by shifting focus from raw materials and inputs exports towards processed and high-value-added commodities while also promoting exports from domestic enterprises to reduce reliance on exports from FDI enterprises. Lastly, improving flexible and active exchange rate regimes consistent with real conditions in both domestic and international markets is necessary to stabilize the exchange rate and foreign currency market in Vietnam.

Originality/value/contribution – This paper contributes to the field by providing specific policy recommendations for Vietnam. These recommendations aim to stabilize the economy, attract FDI, renovate exports, and implement flexible and active exchange rate regimes.

Keywords: Foreign Direct Investment (FDI), trade openness, exchange rate, Gross Domestic Product (GDP) per capita.

JEL Classification: E60, O11, O24.

1. Introduction

Foreign Direct Investment (FDI) and trade are vital factors contributing to the economy. Trade facilitates economic productivity by accelerating capital accumulation, human resources, and technology transferability (Frankel & Romer, 1999). FDI provides capital sources, encourages technology transfer, spills over to human resource development, builds up a competitive business climate, and facilitates the economy (Anwar & Nguyen, 2010; Hobbs et al., 2021). Exchange rates and their choice present a significant function after the crisis period for transition nations (Ghosh et al., 2014; Klein & Shambaugh, 2010; Rose, 2011). Further, the real exchange rate plays a crucial role in developing economies' beginning stage of economic development. However, it may be an inappropriate tool since countries become richer in the long run (Habib et al., 2017).

FDI, trade openness, and exchange rate have been seen as crucial determinants affecting economic growth in a country and regions. Consequently, recent empirical studies have increasingly debated the relationship between these variables. Banday et al. (2021) found that FDI and trade openness had significant and positive effects on economic growth in BRICS (Brazil, Russia, India, China, and South Africa) countries between 1990 and 2018, while Usman (2023) argued that there is a bivariate correlation between economic growth, trade, remittance, and agricultural output in E7 (Russia, Indonesia, Mexico, China, India, Brazil, and Turkey) countries from 1990 to 2020. According to Asafo-Agyei and Kodongo (2022), FDI supports eco-

conomic growth in Sub-Saharan Africa, with the threshold level of FDI inflows per person at approximately US\$ 44.67 per annum. Salik and Aras (2022) found that the relationship between FDI and non-oil Gross Domestic Product (GDP) was insignificant. However, exchange rate fluctuations negatively influenced Nigeria's non-oil GDP in the short term. In the long term, trade openness, FDI, and exchange rate have no significant impact on non-oil GDP in Nigeria. Mudiyansele et al. (2021) argued that trade openness discouraged FDI inflows in Romania between 1997 and 2019, while Zhao et al. (2024) concluded that the degree of trade openness facilitated regional FDI in China for the period 2001-2018.

After 35 years of Renovation, in 1986, Vietnam gained incredible success. GDP growth, employment creation, poverty reduction, and human development are impressive results for three decades in this country (UNDP, 2021). The annual economic growth rate averaged 5.99 percent between 2016 and 2020, recorded as Southeast Asia's highest rate. The GDP increased by nearly US\$70 billion from US\$205.3 billion to US\$271.2 billion for the period 2016-2020. The State Bank of Vietnam implemented relevant exchange rate policies that support stabilizing macroeconomics, the monetary market, and the foreign exchange market. The price of the US dollar for the period 2016-2020 increased by 1.18 percent per year, on average, which was lower than that of 2.56 percent for the period 2011-2015 (General Statistics Office, 2021). However, the protection policies of developed economies, unstable finance, and adverse effects of the COVID-19 pandemic were defined as new issues faced by Vietnam (UNDP, 2021).

With the domestic economy's deep and wide integration into the international market in recent years, Vietnam's economic growth depends upon external drivers such as FDI and trade openness. Moreover, the exchange rate has been indicated as an important factor in monetary policy implemented by the Vietnamese government to stabilize macroeconomics, the monetary market, and the foreign exchange market. Therefore, examining the relationship between economic growth, FDI, trade openness, and exchange rate in Vietnam is necessary.

Nguyen (2020) and Ho et al. (2021) evaluated the relationship between FDI, trade openness, and the economic growth of Vietnam and concluded that FDI and trade openness positively influence the economy. According to Nguyen and Nguyen (2021), public investment negatively influences GDP. However, FDI and trade openness present a positive association with GDP per capita in Vietnam, while Lee et al. (2021) argued that there is an asymmetric relationship between FDI and trade openness. However, previous studies mentioned above ignored the effect of the exchange rate on economic growth in Vietnam. A study by Huong et al. (2020) found a positive relationship between FDI and the real

exchange rate. Trade openness has a positive effect on FDI and the real exchange rate. However, this research did not examine the relationship between FDI, trade openness, the exchange rate, and the economic growth of Vietnam. FDI, trade openness, and exchange rate have been seen as significant factors affecting Vietnam's economic growth, but assessment of the relationship among these variables is still a gap. What is the relationship between economic growth, FDI, trade openness, and Vietnam's exchange rate in both the short run and long run? The study is implemented to answer this question by examining the relationship between FDI, trade openness, exchange rate, and economic growth in Vietnam between 1986 and 2020 using the Vector Error Correction Model (VECM) and the Johansen co-integration test. The VECM and the Johansen co-integration test were employed for this study to evaluate the effect of FDI, trade openness, and exchange rate on Vietnam's economic growth in the short and long run and the relationship among these variables in the long run. Further, the fundamental contribution of this article to the existing literature is to recommend appropriate policies to foster economic growth in Vietnam.

The study's key findings reveal that in the short run, GDP per capita, FDI, and trade openness may generate an appreciation of the Vietnamese currency. In the long run, we found that FDI inflows and trade openness facilitate GDP per capita, but the depreciation of the Vietnam Dong may harm this country's economic growth. The Johansen co-integration test confirmed a long-run association among GDP per capita, FDI inflows, trade openness, and exchange rate, solidifying our research's conclusions.

The rest of this paper is organized as follows: Section 2 presents the literature review, Section 3 illustrates the methods, Section 4 discusses the results and discussion, and finally, Section 5 presents the conclusion and policy implications.

2. Literature review

Examining the relationship between FDI, trade openness, exchange rate, and GDP per capita is essential for understanding and informing the economic policies of developing nations. As a rapidly expanding economy in Southeast Asia, Vietnam provides a compelling case study for such analysis. Over the past decades, Vietnam has experienced substantial economic transformations, primarily driven by trade liberalization, an influx of FDI, and exchange rate reforms. This literature review aims to systematically identify and analyze existing research on these interrelationships in Vietnam and other developing countries across various time frames while pinpointing the limitations and gaps in the extant studies.

2.1. The relationship between FDI and economic growth

Numerous empirical studies have investigated the nexus between FDI and economic growth, with a substantial majority revealing a positive impact of FDI on economic growth (Alfaro et al., 2004; Borensztein et al., 1998; Li & Liu, 2005). Some studies also indicated a bidirectional relationship (Iamsiraroj, 2016).

The relationship between FDI and economic growth in Vietnam has been the subject of extensive study, yielding varied findings. Notably, Anwar and Nguyen (2010) identified a positive correlation between FDI and the Vietnamese economy from 1996 to 2005, especially in the areas of investment in education and training, financial market development, and technology transfer between foreign and local firms. Similarly, Nguyen et al. (2022) found a robust long-term relationship between FDI and economic growth in Vietnam from 1986 to 2020. Furthermore, Nguyen and Nguyen (2021) argued that while public investment exerts a negative long-term impact on the economy, domestic private investment and FDI yield positive effects.

In contrast, Hong Hiep et al. (2023) demonstrated that FDI inflows had limited direct and indirect effects on economic growth across 63 Vietnamese provinces from 2007 to 2018. However, panel regression analysis of data from 47 provinces and cities from 2012 to 2015 by Tran and Hoang (2019) indicated that FDI positively affects the level of GDP in Vietnam. Tuan (2021) highlighted that FDI has contributed significantly to the average economic growth rate of 6.0% per year in Vietnam from 2010 to 2018. Moreover, Dao and Ngo (2023) found that FDI inflows significantly foster economic growth, with FDI enterprises being more productive than domestic firms and creating positive spillover effects on the output growth of domestic firms.

A significant limitation of these studies is their omission of other macroeconomic factors, such as trade openness and exchange rates, which also influence economic growth. Consequently, this recent study addresses these gaps by evaluating the association between short and long term economic growth, FDI, trade openness, and exchange rates in Vietnam.

2.2. The relationship between trade openness and economic growth

The relationship between trade openness and economic growth has been extensively studied in both developed and developing countries, yielding mixed results, as confirmed in the extensive review by Aggarwal and Karwasra (2023).

For example, Amirhalkhali and Dar (2019) examined the relationship between trade openness and individual factor productivity in 27 OECD countries from 2000 to 2015, finding that trade openness facilitated export expansion, thereby enhancing total factor productivity (TFP) and economic growth. Blavasciunaite et al. (2020) asserted that trade deterioration adversely affects GDP in 28 European Union countries. Similarly, Caleb et al. (2014) demonstrated that trade openness accelerated Zimbabwe's economic growth from 1975 to 2005 by stabilizing inflation and reducing trade barriers. Malefane (2020) found that total trade and exports positively influenced GDP in Botswana between 1975 and 2014.

However, Fatima et al. (2020) reported that trade openness negatively impacted economic growth in 80 developed and developing economies from 1980 to 2014. Osei et al. (2019) concluded that GDP growth could enhance trade openness in low-income African countries but negatively affect lower-middle-income economies.

Most studies on Vietnam have found a positive association between trade openness and economic growth (Ho et al., 2021; Nguyen, 2022). However, Thach and Huy (2020) argued that there was no long-term relationship between trade openness and economic performance in Vietnam from 1985 to 2019, although trade openness could promote short-term economic growth.

The findings of these studies are mixed, with some indicating that trade openness supports economic growth, others suggesting it may hinder growth, and some showing an insignificant relationship. Therefore, this paper aims to elucidate the relationship between trade openness and economic growth in Vietnam from 1986 to 2020.

2.3. The relationship between exchange rate and economic growth

Many studies have scrutinized the influence of exchange rate regimes on economic growth. Barguelli et al. (2018) analyzed 45 transitional economies from 1985 to 2015, revealing that exchange rate fluctuations negatively affect GDP. However, they observed that the impact of exchange rate variations is contingent upon the mechanisms governing exchange rates and the degree of financial openness within an economy. Eichengreen (2008) explored the relationship between the real exchange rate and the global economy, contending that maintaining the real exchange rate at competitive levels and avoiding excessive fluctuations could potentially expedite economic growth. Habib et al. (2017) delved into the association between exchange rates and economic performance across 150

nations from 1970 to 2010. While they noted significant effects of the real exchange rate on developing economies, they found no statistically significant impact on advanced economies. Similarly, scant studies focusing on the Vietnamese economy (Do, 2019; Nguyen, 2023) have failed to provide definitive insights into the relationship between the exchange rate and economic growth.

The findings from these investigations indicate that the relationship between exchange rates and economic growth can manifest as positive, negative, or insignificant depending on contextual factors. Consequently, there exists a gap in understanding that the recent study aims to address by examining the nexus between exchange rates and economic growth in Vietnam, in both the short and long term.

2.4. The nexus between FDI, trade openness, and economic growth

The relationship between FDI, trade openness, and economic growth is multifaceted and contentious, characterized by heterogeneous empirical outcomes that vary across different geopolitical contexts (Bieleń et al., 2024). Hobbs et al. (2021) investigated the interconnection between FDI, trade, and economic growth in Albania spanning from 1992 to 2016, affirming the existence of a long-term relationship among these variables. Conversely, Hussain and Haque (2016) found significant influences of FDI and trade on the GDP per capita of Bangladesh from 1973 to 2014. Conversely, Yusuf et al. (2020) explored the relationship between FDI, financial development, and economic development in West Africa from 1996 to 2016, revealing a lack of significant short-term relationships among the variables, albeit with FDI exerting a noteworthy effect on economic growth in the long run.

Ho et al. (2021) investigated the nexus between finance, the economy, and trade openness in six Southeast Asian countries, spanning Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam, over the period 1995-2019. They asserted a positive influence of trade openness on the economy while observing non-statistical significance regarding financial development.

In the specific case of Vietnam, Do and Dinh (2020) estimated the interrelationship among the economy, energy consumption, FDI, trade openness, and carbon dioxide (CO₂) emissions between 1980 and 2014. Their findings indicated adverse effects of GDP per capita, energy consumption, and trade openness on CO₂ emissions while revealing a positive association between FDI and CO₂ emissions. Similarly, utilizing data from 63 provinces in Vietnam spanning from

2005 to 2015, Thanh et al. (2019) identified a substitutive effect of FDI and trade openness on the economy of Vietnam.

Overall, the studies cited underscore the potential of FDI and trade openness to foster economic growth across diverse global contexts. However, they tend to overlook the influence of exchange rates on economic growth. This study contributes to the existing literature by examining the intricate relationship between FDI, trade openness, exchange rates, and economic growth in Vietnam, encompassing both short-term and long-term dynamics.

3. Research methodology

3.1. Data

To evaluate the association between FDI, trade openness, exchange rate, and GDP per capita of Vietnam between 1986 and 2020, we gather data from the World Development Indicators (WDI). This period was chosen for the study due to a shortage of data availability for Vietnam before 1986 and after 2020. Moreover, it covers the Renovation Era when the Vietnamese economy was transferred from a centrally planned economy to a market-oriented economy in 1986. Thus, a total of 35 observations were used for the study.

3.2. The Vector Error Correction Model

The VECM offers a robust framework for analyzing the interplay between co-integrated economic variables. By capturing both short-term fluctuations and long-term equilibrium relationships, the VECM provides a comprehensive understanding of economic dynamics, which is essential for effective policy formulation in developing economies.

The model for this study was constructed according to the work by Ho et al. (2021).

$$GDP_t = f(FDI_t, TR_t, EX_t) \quad (1)$$

where: GDP_t denotes GDP per capita (constant 2015US\$); FDI_t means net inflows of FDI (current US\$); TR_t denotes trade openness (% of GDP); and EX_t represents the official exchange rate (VND per US\$). Descriptions of variables in the VECM are represented in Table 1.

Table 1. Justification of variables in the VECM

Variable	Description	Source	Previous references
GDP per capita	GDP per capita (constant 2015US\$)	WDI	Anwar & Nguyen (2010); Caleb et al. (2014); Blavasciun-aite et al. (2020); Fatima et al. (2020); Malefane (2020); Nguyen & Nguyen (2021); Thach & Huy (2020)
FDI net inflows	FDI net inflows (current US\$)	WDI	Anwar & Nguyen (2010); Malefane (2020); Nguyen & Nguyen (2021)
Trade openness	Trade openness (% of GDP)	WDI	Caleb et al. (2014); Amirkhalkhali & Dar (2019); Fatima et al. (2020); Thach & Huy (2020)
Exchange rate	Exchange rate (VND per US\$)	WDI	Eichengreen (2008); Habib et al. (2017); Barguelli et al. (2018)

Note: VND means Vietnam Dong.

Equation 1 can be transformed into Equation 2 as follows:

$$\ln GDP_t = \beta_0 + \beta_1 \ln FDI_t + \beta_2 \ln TR_t + \beta_3 \ln EX_t + \varepsilon_t \tag{2}$$

where: $\ln GDP_t$, $\ln FDI_t$, $\ln TR_t$, and $\ln EX_t$ denote the natural logarithms of GDP per capita, FDI net inflows, trade openness, and the official exchange rate; β_0 is the intercept; $(\beta_1, \dots, \beta_3)$ are parameters to be estimated; and ε_t represents the error term.

There are four steps to run the VECM as follows. First, the stationarity of the series or their order of integration in all variables will be checked. In this article, the Augmented Dickey–Fuller (ADF) test and Phillips–Perron (PP) test were employed to examine the stability of the series. Second, the optimal lag for the VECM was determined. Next, the Johansen co-integration test was used to investigate a long-run relationship among all variables. Finally, the VECM was estimated in both the short and long run.

4. Results

4.1. Overview of GDP per capita, FDI, trade openness, and exchange rate in Vietnam

As seen in Table 2, Vietnam’s average GDP per capita of Vietnam is US\$1,284.5. This country’s FDI net inflows and trade openness average reach US\$5 billion and 109.6 percent, respectively. Vietnam’s average official exchange rate is 14,551 VND per US\$ (Table 2).

Table 2. Characteristics of GDP per capita, FDI, trade openness, and exchange rate in Vietnam between 1986 and 2020

Variable	Mean	SD	Min	Max
GDP per capita	1284.50	669.93	481.3	2655.8
FDI net inflows	5.04e+09	5.28e+09	40000	1.61e+10
Trade openness	109.68	54.27	9	201.1
Exchange rate	14551.38	6523.71	22.9	23208.4

Note: SD denotes the standard deviation.

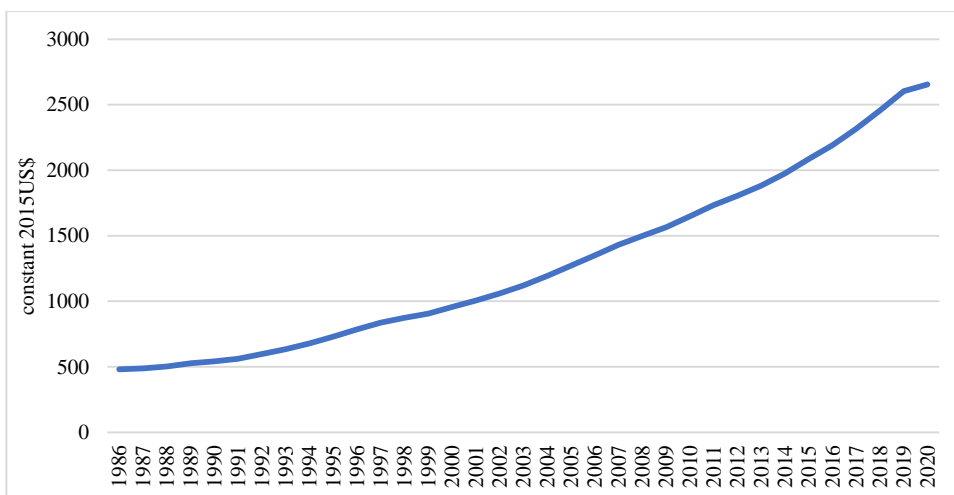
Source: Author's own calculation (2022).

Table 3. Pairwise correlation of variables in the VECM

Variable	LnGDP per capita	LnFDI net inflows	LnTrade openness	LnExchange rate
LnGDP per capita	1.000			
LnFDI net inflows	0.795	1.000		
LnTrade openness	0.852	0.869	1.000	
LnExchange rate	0.635	0.900	0.900	1.000

Source: Author's own calculation (2022).

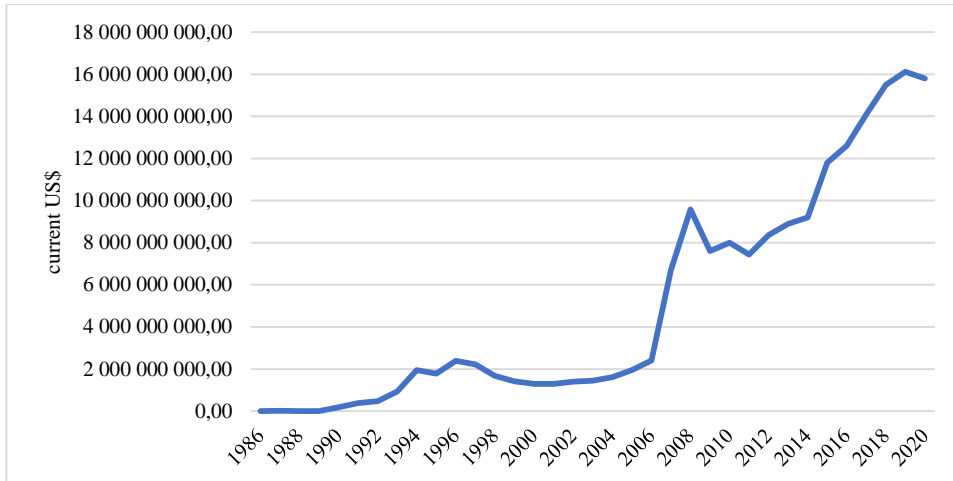
Table 3 presents the pairwise correlation of variables in the VECM, and this result is appropriate for running the VECM in the following steps.

Figure 1. GDP per capita of Vietnam

Source: World Bank (2022).

Vietnam's GDP per capita increased between 1986 and 2020. Beginning at approximately US\$481 in 1986, it increased by 5.5 times to reach US\$2,655 in 2020, marking a remarkable achievement in the country's Renovation over the last 35 years (Figure 1).

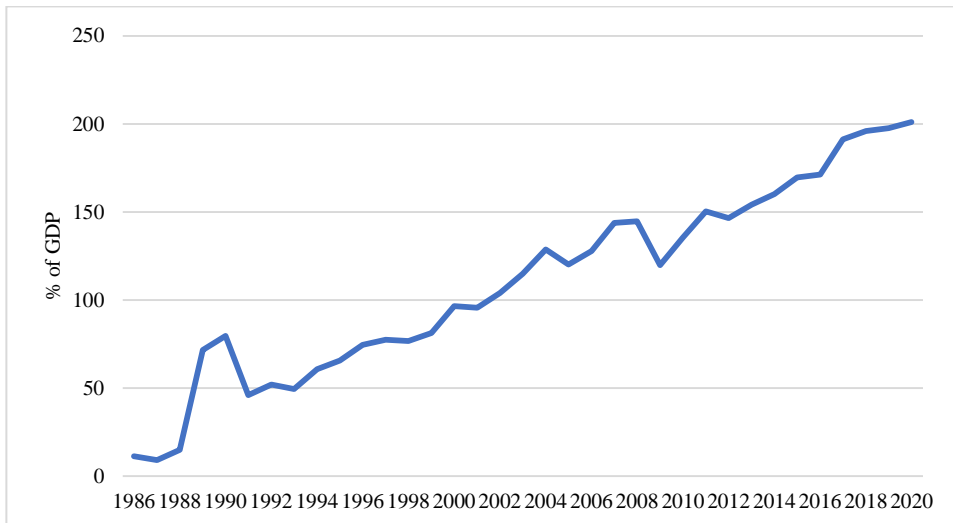
Figure 2. FDI net inflows of Vietnam



Source: World Bank (2022).

As seen in Figure 2, Starting with only US\$40,000 in 1986, Vietnam’s net FDI inflows rapidly increased to reach US\$15.8 billion by 2020. This significant expansion of FDI can be seen as the result of implementing appropriate policies to attract FDI by the Vietnamese Government since the Renovation in 1986 (Vi Dũng et al., 2018).

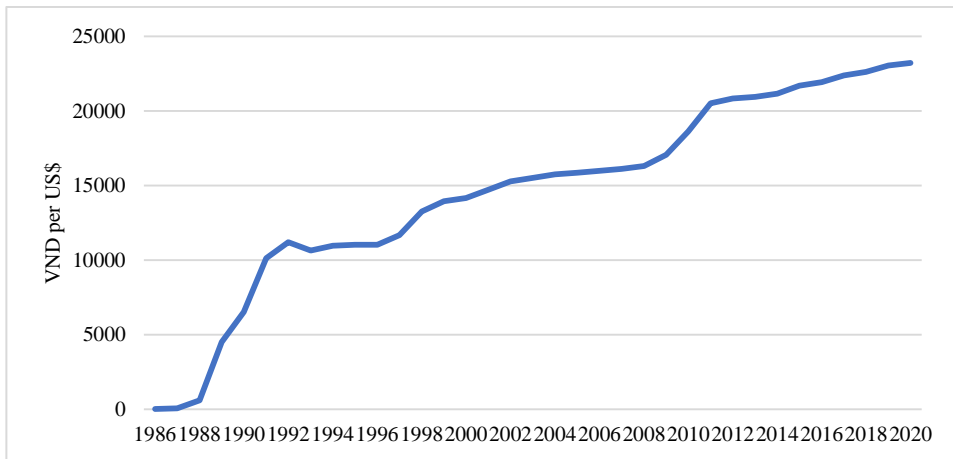
Figure 3. Trade openness of Vietnam



Source: World Bank (2022).

Trade openness also showed impressive growth from 1986 to 2020. For instance, starting at only about 11 percent of GDP in 1986, it significantly increased to over 201 percent of GDP in 2020, pushing Vietnam to stand second in Southeast Asia in trade openness, behind Singapore. The expansion of trade openness also reflects the development of exports and imports and the deeper and broader integration of Vietnam into international markets (Figure 3).

Figure 4. The official exchange rate of Vietnam



Source: World Bank (2022).

The official exchange rate in Vietnam increased between 1986 and 2020. The State Bank of Vietnam manages the official exchange rate mechanism to achieve targets related to macroeconomic stability, inflation control, and economic growth (Figure 4).

4.2. The influence of FDI, trade openness, and exchange rate on the GDP per capita of Vietnam

The unit root test

The Augmented Dickey-Fuller (ADF) test and the Phillips-Peron (PP) test were employed to examine the stationarity of all variables with the hypothesis as follows:

Null hypothesis (H₀): The variables contain a unit root.

Alternative hypothesis (H_a): The variables do not contain a unit root.

If a variable contains a unit root, then this implies that the time series of this variable is non-stationary.

Table 4. Results of the unit root test

Variables		ADF Test		PP Test		Conclusion
		Level	1 st difference	Level	1 st difference	
LnGDP per capita	Constant	-1.31	-3.10**	0.17	-3.53***	I(1)
	Constant & trend	-1.84	-2.96	-2.82	-14.34*	I(1)
LnFDI	Constant	-1.46	-0.50	-1.94	-1.40	
	Constant & trend	0.22	-1.36	-0.08	-1.64	
LnTrade openness	Constant	-4.26***	-5.94***	-3.27**	-4.78***	I(0)
	Constant & trend	-6.97***	-6.43***	-3.35*	-5.12***	I(0)
LnExchange rate	Constant	-9.81***	-5.46***	-11.15***	-2.39	I(0)
	Constant & trend	-13.18***	-4.75***	-9.09***	-2.18	I(0)

Note: ***, **, and * denote statistical significance at 1%, 5%, and 10%, respectively.

Source: Author’s own calculation (2022).

As seen in Table 4, the trade openness and exchange rate time series were stationary at the level [I(0)] because the absolute value of test statistics is greater than critical values at 1% and 5%, respectively. However, the GDP per capita time series was not stationary at this level. Therefore, the first difference was implemented to examine the stationarity of these variables. Results indicate that the absolute values of test statistics are greater than critical values at 1% and 10%, respectively. Therefore, we can conclude that the time series of this variable does not contain unit roots. The time series of FDI is not stationary. Thus, the VECM was chosen to run for the next step.

Determination of the optimal lag for the VECM

This step aims to determine the optimal lag for the VECM.

As seen in Table 5, AIC and HQIC indicators recommend that the optimal lag is four lags. Therefore, four lags (the number of lags is equal to 4) were chosen to run the VECM in the third step. The long-run relationship among variables was checked by the Johansen co-integration test with the following hypothesis:

Null hypothesis (H₀): There is no co-integration among variables.

The alternative hypothesis (H_a): There is co-integration among variables.

Table 5. Selection of the lag length

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-45.73				0.000	3.20	3.26	3.39
1	109.41	310.3	16	0.000	3.7e-08	-5.76	-5.46	-4.84
2	133.51	48.21	16	0.000	2.3e-08	-6.29	-5.74	-4.62
3	166.35	65.67	16	0.000	9.2e-09	-7.37	-6.59	-4.97*
4	190.72	48.74*	16	0.000	7.4e-09*	-7.91*	-6.89*	-4.77
Endogenous: LnGDP LnFDI LnTrade openness LnExchange rate								
Exogenous: Constant								
Number of observations = 31								

Notes: * denotes lag order selected by the criterion; LL means log-likelihood values; LR represents sequential modified LR test statistics; FPE denotes final prediction error; AIC means Akaike information criterion; HQIC represents Hannan–Quinn information criterion, and SBIC means Schwarz’s Bayesian information criterion.

Source: Author’s own calculation (2022).

Examination of the relationship among variables in the long run

Table 6. Results of trace statistics in the Johansen co-integration test

Maximum rank	LL	Eigenvalue	Trace statistic	5% critical value	1% critical value
0	67.73		65.63	47.21	54.46
1	88.68	0.71	23.72 ^{*1*}	29.68	35.65
2	97.42	0.41	6.25	15.41	20.04
3	100.43	0.16	0.22	3.76	6.65
4	100.55	0.00			

Note: ^{*1} and ^{*5} denote the number of co-integrations (ranks) chosen to accept the null hypothesis at 1% and 5% critical values.

Source: Author’s own calculation (2022).

As seen in Table 6, the trace statistics are smaller than the 1% critical value (23.72 < 29.68) and the 5% critical value (23.72 < 35.65), reflecting that there is one co-integration at the 1% and 5% critical values among variables.

Estimation of the VECM

Table 7. Estimation of the VECM in the short run

Variables	Coefficient	Std. Error	z	P-value
1	2	3	4	5
DLnGDP per capita				
Correction error term (ECT)	-0.00	0.00	-0.72	0.472
LnGDP per capita				
LD	0.46	0.38	1.21	0.227
L2D	-0.05	0.33	-0.18	0.860
L3D	-0.15	0.31	-0.49	0.626
LnFDI				
LD	-0.00	0.01	-0.78	0.438

Table 7 cont.

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
L2D	0.01	0.00	1.20	0.229
L3D	0.00	0.01	0.45	0.651
LnTrade openness				
LD	0.03	0.04	0.86	0.390
L2D	0.03	0.03	0.82	0.413
L3D	-0.00	0.01	-0.15	0.881
LnExchange rate				
LD	-0.05	0.04	-1.32	0.188
L2D	-0.01	0.05	-0.31	0.754
L3D	0.01	0.02	0.68	0.499
Constant	0.03*	0.02	1.77	0.077
DlnFDI				
Correction error term (ECT)	-0.10*	0.06	-1.68	0.092
LnGDP per capita				
LD	149.01	184.35	0.81	0.419
L2D	-140.73	159.36	-0.88	0.377
L3D	-25.39	147.64	-0.17	0.863
LnFDI				
LD	-0.36	5.32	-0.07	0.945
L2D	2.07	4.24	0.49	0.626
L3D	-2.41	4.80	-0.50	0.615
LnTrade openness				
LD	-7.09	19.44	-0.36	0.715
L2D	-4.46	17.71	-0.25	0.801
L3D	-5.23	9.01	-0.58	0.562
LnExchange rate				
LD	3.84	19.34	0.20	0.843
L2D	9.77	24.55	0.40	0.691
L3D	-4.55	13.25	-0.34	0.731
Constant	-0.00	10.03	-0.00	1.000
DlnTrade openness				
Correction error term (ECT)	-0.01	0.10	-0.97	0.332
LnGDP per capita				
LD	2.56	2.79	0.92	0.360
L2D	-0.02	2.41	-0.01	0.991
L3D	0.72	2.24	0.32	0.745
LnFDI				
LD	-0.04	0.08	-0.59	0.552
L2D	-0.08	0.06	-1.26	0.206
L3D	-0.00	0.07	-0.05	0.956
LnTrade openness				
LD	-0.29	0.29	-1.00	0.320
L2D	-0.12	0.26	-0.48	0.631
L3D	-0.20	0.13	-1.48	0.139
LnExchange rate				
LD	0.52*	0.29	1.77	0.076
L2D	-0.40	0.37	-1.08	0.280
L3D	0.27	0.20	1.34	0.179
Constant	-0.08	0.15	-0.57	0.568

Table 7 cont.

	1	2	3	4	5
DLnExchange rate					
Correction error term (ECT)		0.02***	0.00	7.52	0.000
LnGDP per capita					
LD		0.40	0.62	0.65	0.517
L2D		-0.17	0.54	-0.32	0.747
L3D		-1.41***	0.50	-2.82	0.005
LnFDI					
LD		-0.04***	0.01	-2.58	0.010
L2D		-0.05***	0.01	-3.73	0.000
L3D		-0.05***	0.01	-3.30	0.001
LnTrade openness					
LD		-0.24***	0.06	-3.63	0.000
L2D		-0.15***	0.06	-2.57	0.010
L3D		0.00	0.03	0.22	0.824
LnExchange rate					
LD		0.14**	0.06	2.18	0.029
L2D		0.19**	0.08	2.35	0.019
L3D		0.00	0.04	0.15	0.880
Constant		0.06*	0.03	1.83	0.068

Notes: LD, L2D, and L3D mean lag 1, lag 2, and lag 3, respectively; ***, **, and * denote statistical significance at 1%, 5%, and 10%, respectively.

Source: Author's own calculation (2022).

As seen in Table 7, the error correction term of the FDI model is negative and statistically significant (ECT = -0.10), and this implies the existence of unidirectional causality running from GDP per capita and trade openness to FDI. Thus, the result of ECT also states that about 10 percent of the disequilibrium of the FDI model was corrected by GDP per capita and trade openness every year. Likewise, the error correction term of the exchange rate model is positive and statistically significant (ECT = 0.02), and this reflects the existence of unidirectional causality running from GDP per capita and trade openness to the exchange rate. Therefore, the result of ECT also addresses that about 2 percent of the disequilibrium of the exchange rate model was corrected by GDP per capita and trade openness every year. Moreover, results also stated a bidirectional causality running from FDI to exchange rate. GDP per capita, FDI, and trade openness have significant and adverse effects on the exchange rate in Vietnam. These imply that appreciation of the Vietnamese currency (VND) may reduce this country's economic growth, FDI, and trade openness in the short run.

Table 8. Estimation of the VECM in the long run

Variables	Coefficient	Std. Error	z	P-value
LnGDP per capita	1			
LnFDI	0.77***	0.11	7.00	0.000
LnTrade openness	1.71***	0.54	3.15	0.002
LnExchange rate	-8.15***	1.07	-7.58	0.000
Constant	47.36			

Note: *** denotes statistical significance at 1%.

Source: Author’s own calculation (2022).

Table 8 shows the estimation of the VECM in the long run. It has been empirically found that FDI and trade openness accelerate economic growth in Vietnam in the long run, but depreciation of the Vietnamese currency may reduce economic growth. Results reflect that Vietnam should promote FDI and trade, and carefully control the exchange rate to foster economic growth.

5. Discussion

We found that GDP per capita, FDI, and trade openness lead to the depreciation of VND in the short run. Our results are consistent with the conclusions of IMF (Kandil & Mirzaie, 2003), Habib et al. (2017), and Barguelli et al. (2018), who argued that exchange rate volatility reduces economic growth in developing and emerging countries. The achievement in Vietnam’s economic growth in recent years can be identified as the result of implementing appropriate macroeconomic policies in economic structure adjustment, labor structure adjustment, inflation control, FDI attractiveness, and export enforcement. Economic structure has been transformed from width to depth by increasing the contribution of TFP to economic growth instead of labor and capital. For instance, TFP contributed about 45.7 percent to the economy of this country for the period 2016-2020, 13 percent higher than that between 2011 and 2015. The labor rate in agriculture rapidly decreased from 41.6 percent in 2016 to 33.1 percent in 2020. Labor percentage in industry and construction sharply rose from 25.2 percent in 2016 to 30.8 percent in 2020. The labor rate in services also jumped from 33.3 percent in 2016 to 36.1 percent in 2020. The inflation rate remained at 3.1 percent from 2016 to 2020, which was lower than the inflation rate of 7.6 percent between 2011 and 2015. In Vietnam, economic growth, employment generation, and stable inflation, fostered output, enhanced exports, and decreased the exchange rate via domestic currency appreciation.

Moreover, Vietnam has become an attractive destination for foreign investors in recent years because of a stable political and socio-economic environment. By 2019, FDI net inflows to this country reached more than US\$16.1 billion. Invested capital was efficiently used, and the Incremental Capital Output Ratio (ICOR) of Vietnam accounted for 6.1 for the period 2016-2019, on average. FDI provides capital sources for the host country, transfers technology, improves labor productivity, and encourages innovation of domestic firms. FDI net inflows assist developing countries like Vietnam in consolidating foreign currency sources such as the US dollar to stabilize the official exchange rate. Thus, an increase in FDI net inflows allows Vietnam to reduce the US dollar shortage and stabilize the valuation of VND in the domestic market.

The growth of trade openness also contributes to reducing the exchange rate volatility in Vietnam. By 2020, the trade openness of Vietnam reached more than 200 percent of GDP, implying that this country is broadly and deeply integrated into the international market. Trade policy adjustments from export-stimulating with protectionism to export-stimulating with trade liberalization encouraged Vietnam to enhance exports and gain a surplus trade balance. On average, Vietnam's annual export growth rate accounted for 11.8 percent between 2016 and 2020. Exports have become the critical determinant of the acceleration of Vietnam's economic growth. Hence, trade openness can reduce the volatility of Vietnam's exchange rate in Vietnam by increasing the economy.

In the long term, results indicated that FDI and trade openness support Vietnam's economic growth. However, the depreciation of the VND can reduce economic growth in this country. As discussed above, FDI and trade openness are vital motivators contributing to the Vietnamese economy. Therefore, these determinants should be promoted in the long run to achieve the economic growth target. Entrance of FDI projects to Vietnam should be carefully examined to meet social and environmental routines as the commitment of the Vietnamese government to Free Trade Agreements (FTAs) such as Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTTP) and European Union–Vietnam Free Trade Agreement (EVFTA). Terms in new generation FTAs request complicated standards in certificates of goods origin, labor safety and hygiene, environmental standards, and intellectual property. Apart from the number of FDI projects, the technology of FDI projects and connection with domestic enterprises should be facilitated to improve the quality of FDI projects. Therefore, FDI projects with backward technology, overwhelming use of low-wage labor, and the exploitation of natural resources should be rejected. A high

rate of trade openness may harm the Vietnamese economy since shocks, uncertainties, and risks of supply, demand, and prices in the international market strongly influence it. Depreciation of VND negatively affects the economy in the long term because it generates an increase in production costs and inflation and decreases the output in the domestic market. The effects of the exchange rate variation depend on exchange rate mechanisms and trade openness (Barguelli et al., 2018).

6. Conclusions

The article explores the relationship between GDP per capita, FDI inflows, trade openness, and the exchange rate in Vietnam between 1986 and 2020 using the VECM. It has been empirically found that GDP per capita, FDI inflows, and trade openness may lead to the appreciation of the Vietnamese currency in the short term. The findings also suggest that FDI inflows and trade openness support economic growth, but the depreciation of the VND can harm the country's economic growth in the long run. The Johansen co-integration test confirmed a long-run relationship among variables. Results also demonstrated a unidirectional causality running from GDP per capita and trade openness to FDI and from GDP per capita and trade openness to exchange rate. In addition, a bidirectional causality ran from FDI to the exchange rate.

Policies are proposed to achieve targets for macroeconomic stability for Vietnam. Firstly, fiscal and monetary policies should be implemented to achieve macroeconomic stability, economic development, employment creation, and inflation control targets. These measures can assist Vietnam in dealing with crises such as the COVID-19 pandemic, overcoming the middle-income trap, and becoming a high-income nation by 2045. Secondly, FDI inflows should continue to be encouraged as they accelerate economic growth. However, FDI projects should focus on improving labor skills and technological progress, and promoting sustainable development in crucial sectors such as agriculture, energy, and the environment. Thirdly, it fosters innovation in exports by shifting the focus from raw materials and inputs exports towards processed and high-value-added commodities. It also promotes exports from domestic enterprises to reduce reliance on exports from FDI enterprises. Lastly, implementing flexible and active exchange rate regimes consistent with real conditions in both domestic and international markets is necessary to stabilize Vietnam's exchange rate and foreign currency market.

The study is unable to avoid the following limitations. Firstly, the time-series data for the paper was gathered between 1986 and 2020 due to a shortage of data availability. Therefore, the dataset should be extended to evaluate the relationship between GDP per capita, FDI inflows, trade openness, and the exchange rate of Vietnam. Secondly, the influence of other macroeconomic variables, such as unemployment, inflation, and interest rates, on economic growth should be included in the model. Thus, the model should be constructed in future research to investigate the nexus between economic growth, FDI inflows, trade openness, and the exchange rate over a more extended period and additional variables.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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