

The relationship among foreign direct investment, trade openness, and economic growth in vietnam from 1991 to 2023



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Abstract To analyze the impact of FDI and TO on economic growth in Vietnam, the research team collected yearly data from 1991--2023 from the Vietnam General Statistics Office on the IFS-IMF and WB sites. The study used the VECM model with the following endogenous variables: foreign direct investment (FDI), trade openness (TO), real gross domestic product (GDP), and the interest rate of the U.S. Federal Reserve (IFED). Research results have shown that maintaining economic growth over the years drives economic growth. Moreover, the research supports the view that foreign direct investment and trade openness play important roles in promoting economic growth (g) in Vietnam. The authors propose some recommendations for attracting and using FDI and increasing trade openness to encourage economic growth in Vietnam.

Keywords: Foreign direct investment, FDI, trade openness, TO, economic growth, Vietnam

1. Introduction

Foreign direct investment capital is a source of foreign investment capital that can be used to invest in production, business, and services to earn profits. This area is a large source of capital and has important significance in economic development in developing countries. FDI capital contributes to increasing total investment in the economy. Changes in investment can have a major effect on aggregate demand and, thus, output and employment. When investment increases, the need to purchase machinery and equipment means of transport, construction materials, etc., increases. The investment will increase production capital, meaning that new factories, equipment, and means of transport will be put into production and circulation, increasing the economy's productivity. This change will have an impact on the economy's total supply. The impact of investment and production capital is a combination and interwoven, continuously impacting economic growth (Linh & Dung, 2008)

Endogenous growth theory was developed by many economists, such as Lucas (1988) and Mankiw et al. (1992), who emphasized the role of savings in economic growth. Endogenous growth theory shows that FDI promotes long-term economic growth through technology transfer channels and human capital accumulation through labor skills training courses for the host country. Anh et al. (2023) noted that FDI capital and commodity export turnover impact economic growth. In addition, Brems (1970) has shown that FDI helps supplement development investment capital. According to Jose (2003), FDI contributes to developing human resources, creating jobs, expanding markets, promoting exports, and accelerating the process of economic restructuring.

In addition, many theories of international trade, including mercantilism, absolute advantage theory, comparative advantage theory, proportionality theory, and international product life cycle theory, exist. The new theory of trade and the theory of national competitive advantage highlight the role of international trade in economic growth. Globalization and international economic integration have brought countries closer together, playing an important role in the growth and development of countries. Owing to the process of globalization and international economic integration, flows of finance, information, skills, technology, and goods between countries have increased rapidly. International trade has played an important role in improving skills and accumulating human capital because import-export businesses are pushed to apply advanced technology and improve management skills to cope with increasingly fierce competition.

To consider the interactive relationships among foreign investment capital, trade openness, and Vietnam's economic growth from 1991--2023, the research team chose to address the following topic: "*The relationships among foreign direct investment, trade openness and economic growth in Vietnam*". The research results suggest solutions to attract and effectively use FDI capital, increase trade openness to increase economic growth, and ensure that macroeconomic goals are set out by Vietnam.



2. Conceptual framework and literature review

2.1. Conceptualization

2.1.1. Foreign direct investment (FDI)

Foreign direct investment (FDI) is an international investment in which the owner of capital also directly manages and directs capital use activities. FDI is the investment of companies in building facilities and branches abroad and owns all or part of those facilities. This is a type of investment in which foreign investors contribute large enough capital to production or service provision, allowing them to participate in managing and administering the investment object directly. (Binh & Lang, 2008). Foreign direct investment is the capital of a foreign private company investing directly in another country for production, business, and services for profit (Duong, 2011).

FDI is made mainly from private capital, which is the capital of companies aiming to gain higher profits by deploying production and business activities abroad (Binh & Lang, 2008).

2.1.2. Trade openness (TO)

Trade openness (TO) refers to the relative size of the foreign trade sector in an economy, measured by the criterion of total import-export turnover/GDP (Tung, 2014).

$$TO = \frac{X + IM}{GDP}$$

In there:

TO: Trade openness

X: Export value

IM: Import value

GDP: Gross domestic product

2.1.3. Economic growth (g)

The increase in nominal GDP does not accurately reflect the increase in the output of goods produced in the economy because it includes an increase in factor prices. Real GDP reflects the increase in the output of goods and services produced in the economy because it ignores the increase in price factors (the price level is chosen to be fixed over the years). Therefore, economists use the real GDP indicator when calculating the economic growth rate. The economic growth rate is the percentage change in real GDP of this period/year compared with that of the previous period/year (Tung et al., 2019).

$$g^t = \frac{GDP_r^t - GDP_r^{t-1}}{GDP_r^{t-1}} \times 100\%$$

In there:

g: Economic growth rate in year t

GDP_r^t : Real GDP of year t

GDP_r^{t-1} : Real GDP of the year (t – 1)

2.2. Literature review

2.2.1. Studies on the role of foreign direct investment in economic growth

According to the neoclassical model, long-term growth can result from an increased labor force and scientific and technical technology. Therefore, FDI can affect economic growth only if it truly improves the scientific and technical technology of the receiving country. An increase in capital flowing into the country could have a long-term effect. According to endogenous growth theory, FDI contributes directly to economic growth through the creation of more capital and newer technologies; it contributes indirectly through improvements in human capital, facilities, institutions, and spillover effects. Positive externalities can be expressed in the form of management skills, organization, and workforce training. FDI can also help recipient countries access world markets. (Canh & Quyen, 2017)

Foreign direct investment (FDI) is an important factor contributing to the economic growth of recipient economies. In developing economies, FDI creates opportunities to access capital sources and jobs and transfer technology and production techniques. Because of these benefits, developing economies have considered attracting FDI to be a driving force in economic development strategies and actively strive to improve market conditions and the investment environment to attract foreign investors. Many factors, such as market size, growth rate, economic openness, trade barriers, capital, human resources, and labor costs, have been shown to have an impact on FDI. (Breusch et al., 1979)

There are many theoretical and practical studies on the impact of foreign investment on developing countries' economic growth. Borensztein, De Gregorio and Lee (1998) show that foreign direct investment is an important channel in technology transfer and contributes more to economic growth than domestic investment does. However, the higher productivity of foreign direct investment only materializes when the host country has a minimum threshold of human capital, i.e., foreign direct investment contributes to economic growth only when the receiving country has enough capacity to absorb advanced technology. This shows that human capital plays a decisive role in the success of foreign direct investment and economic growth.

2.2.2. Studies on the role of trade openness (TO) in economic growth

Many economic scholars have mentioned and analyzed the role of trade openness in promoting economic growth. Most researchers' ideas suggest that expanding exports will create momentum for economic development (Helpman & Krugman, 1985). According to Barro and Sala-i-Martin (1995) and Rivera-Batiz & Romer (1991), trade openness can promote long-term economic growth, increase the efficiency of resource allocation, and improve total factor productivity through the development of technological capabilities. Therefore, this creates the expectation that countries or localities with greater trade openness can achieve higher growth rates (Belloumi, 2014). In addition, expanding exports can increase the foreign exchange supply, increase capital, and stimulate output growth (Balassa, 1978; Esfahani, 1991). According to the World Bank (1987), the impact of trade openness on economic growth for any country is also determined on the basis of its economic policy framework. Keho & Grace Wang (2017) examined the relationship between TO and economic growth for Cote d'Ivoire. The results show that trade openness has positive effects on economic growth both in the short and long run. They reveal a positive and strong complementary relationship between trade openness and capital formation in promoting economic growth. Furthermore, trade openness is not entirely a matter of economic policy; it also depends on the geographical scale of each region. (Frankel and Romer, 1999). Therefore, the growth in trade openness does not always drive economic growth; rather, it also depends on economic policies, geographical characteristics, and the development orientation of the country or region. The study of Malefane et al. (2018) found that trade openness has a positive and significant impact on economic growth of South African economy - when the ratio of total trade to GDP is used as a proxy, but not when the three other proxies are employed. However, in the short-run, when the first three proxies of openness are used, the study finds trade openness to have a positive impact on economic growth, but not so when the trade openness index is employed.

However, not all economists agree that trade openness plays an important role. Rodriguez and Rodrik (1999) reported that the positive correlation between trade openness and growth is not robust because of the method used to measure trade openness and the lack of appropriate control variables. In addition to the positive effects of trade openness on growth, some findings suggest that trade openness can inhibit economic growth. Trade liberalization imposes exogenous constraints on economic growth. This is especially detrimental to emerging economies, as it contributes to dependence on international demand and increases countries' disadvantage in regard to international market fluctuations. In addition, Rodrik (1992) mentioned that trade openness can cause macroeconomic instability by increasing inflation, devaluing domestic currency, and leading to a balance of payments crisis, whereas Levine and Renelt (1992) argued that a higher level of trade openness negatively affects domestic investments. Finally, Batra and Slottje (1993) and Leamer (1995) noted that trade liberalization could be a major source of economic recession. Trade liberalization implies accepting lower tariffs, making imports more attractive than domestic goods. In this case, the domestic economy may be disadvantaged.

Nguyen & Bui (2021) examined the the nonlinear impact of trade openness (TO) on economic growth (EG) in the Asean-6 countries (Indonesia, Malaysia, Thailand, Singapore, Philippines, and Vietnam). This paper found that there is a nonlinear impact of TO on EG, whereby TO has two threshold values. Specifically, before the first threshold value, TO plays an important role in boosting EG. However, this impact level decreases gradually when TO exceeds this threshold value. In particular, when exceeding the second threshold value, the impact of TO on EG is still positive but has a relatively low value. The research results show that if TO increases to a high level (beyond the threshold value) without combining with other complementary policies, this does not encourage high-efficiency EG. In addition, this study also shows that EG is positively affected by domestic investment and negatively affected by financial crisis. Research of Bunje et al. (2022) indicated that trade openness has a mixed influence on economic growth. Similarly, when subdividing Africa into sub-regions, trade openness demonstrated a non-linear relationship with GDP, but the result in Northern Africa is sturdy in terms of economic growth. Trade openness has a negative and statistical effect on GDP per capita, as per the fixed-effects model. Finally, trade openness is not resilient across various openness measures and robustness regression estimates

2.2.3. Studies on the relationships among foreign direct investment, trade openness, and economic growth

According to the international investment theory formulated by Dunning (1981), FDI can be divided into three common types: (i) Market-seeking FDI to expand market share and meet local market needs. This type of FDI is strongly influenced by market size and market growth. (ii) Resource-seeking FDI means that the goal is to exploit natural resources and raw materials and take advantage of cheap labor in the host country to produce goods, refined raw materials, and then exported to the

world market. (iii) Efficiency-seeking FDI: This type of FDI targets geographical areas where the level of science, technology, and infrastructure allows them to achieve efficiency at scale. Additionally, according to Dunning (1992), all three types of FDI have an impact on increasing the trade openness of the economy because the nature of FDI is a typical form of relationship in international economic cooperation. In particular, FDI always entails the movement and rotation of production resources, goods, and services from the world into the host country and vice versa; FDI also promotes movement and rotation from the host country to the world.

Many empirical studies in many countries have confirmed the stability of the above theoretical framework. Research by Fischer (2003) was conducted with data from 55 developing countries, and the results revealed a positive relationship between FDI and export turnover. Asiedu (2002), with a research sample of 71 developing countries, also reported a promoting effect (positive relationship) of FDI on trade openness. Yasmin et al. (2003) researched 15 developing countries on many continents and reported that FDI has a positive relationship with trade openness, with the strongest correlation occurring in developing countries in the low-income group. Authors Demirhan & Mask (2008) conducted research in 38 developing countries; the results also confirm that FDI has an impact on increasing trade openness. Amal et al. (2010) showed that FDI in eight Latin American countries is positively related to total import–export turnover (that is, it is also positively related to trade openness). Sichei & Kinyondo (2012) conducted research with data from 45 African countries, and the results also prove that FDI has an impact on increasing trade openness. In Ghana, Antwi (2013) also confirmed that FDI has a positive relationship with the economy's trade balance.

However, not all economists agree on the positive role of foreign direct investment and trade openness in promoting economic growth. Research by Woo (1995) shows that FDI does not have a positive effect on economic growth, and research by Foreman-Peck (1995), Williamson and O'Rourke (1999), and Vamvakidis (2002) argues that trade openness has no relationship with growth and even has the opposite effect. Marilyne Huchet-Bourdon et al. (2018) found a non-linear pattern between the export ratio and the quality of the export basket, suggesting that openness to trade may impact growth negatively for countries which are specialised in low-quality products and a non-linear relationship between export variety, the export ratio and growth as well, suggesting that countries increasing their exports will grow more rapidly after reaching a certain degree of the extensive margin of exports.

3. Methodology

3.1. Theoretical research methods

Analysis and synthesis methods clarify the theoretical basis of FDI, trade openness, and economic growth. The authors conducted an overview of research through academic database systems, including Researchgate, Science Direct, IEE Explore, Scopus, Emerald, Insight, Taylor and Francis, in addition to the Google Scholar search engine and information pages on the relationships among FDI, trade openness, and economic growth in Vietnam and some economies worldwide. From there, determine the model that considers the relationship between these macro variables.

3.2. Practical research methods

Secondary data from the GSO, International Financial Statistics, WB, and other websites related to FDI, trade openness, and economic growth are collected and analyzed. This shows the qualitative and quantitative relationships among FDI, trade openness, and Vietnam's economic growth from 1991–2023.

The topic collects secondary data, which are analyzed with the support of Excel software, Eviews 12. The results of the data analysis contribute to determining the relationships among FDI, trade openness, and Vietnam's economic growth from 1991–2023.

On the basis of theory and a research overview, the research team chose the VECM model to examine the relationships among foreign direct investment, trade openness, and economic growth from 1991–2023. The VECM model is an econometric model that examines the dynamics and interdependence between several macroeconomic variables over time. The steps used to test and build a model to show the relationships among FDI, TO, and economic growth through the VECM model are as follows:

- The variables in the model are identified. The variables in the VECM model are nonstationary variables, so the determination of variables must be based on considering the stationarity of the data series.
- The optimal delay of the model is determined according to the statistical standards LR, FPE, AIC, SC, and HQ.
- Granger causality test, serial correlation test, and number of cointegration relationships between series.
- After completing the tests, we conduct model estimation, find response functions, and analyze variance decomposition.

4. Relationships between foreign direct investment, trade openness, and economic growth in Vietnam

4.1. Status of foreign direct investment, trade openness, and Vietnam's economic growth from 1991–2023

To analyze the current situation of foreign direct investment, trade openness, and Vietnam's economic growth from 1991–2023, the research team was divided into five periods: 1991–1997; 1998–2004; 2005–2012; 2013–2019; and 2020–2023.

4.1.1. Status of foreign direct investment (FDI) in Vietnam from 1991–2023

The total foreign direct investment (FDI) in Vietnam from 1991–2023 is shown in Figure 1.

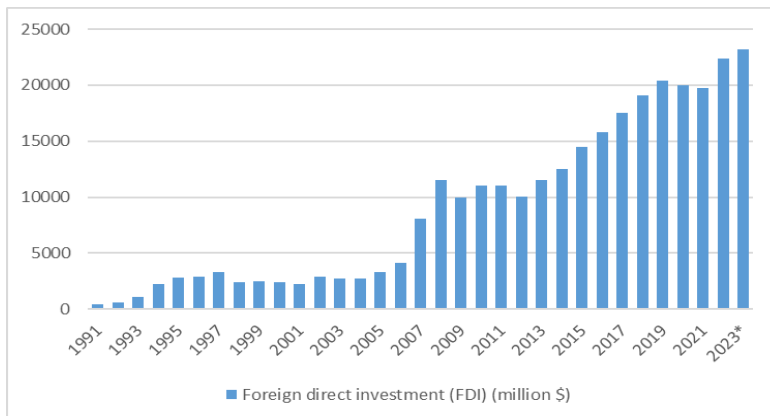


Figure 1 Total foreign direct investment (FDI) in Vietnam from 1991–2023. Source: IFS.

Period 1991–1997: Vietnam began receiving FDI in 1991, with realized capital reaching 428.5 million USD. The period 1991–1997 had a significant FDI growth rate. In 1992, the total realized FDI capital increased by 34.16% compared with that in the previous year. The average growth rate during this period was 45.07%/year. In 1993 and 1994, FDI increased the fastest, with growth rates of 94.38% and 100.5%, respectively, compared with those in the previous year. In the period of 1995–1997, the FDI growth rate slowed compared with that in previous years; however, the growth rate was still positive.

Period 1998–2004: This period showed continuous fluctuations in FDI over the years. In 1998, total FDI capital decreased to 2,372.4 million USD, 27.6% lower than that in the previous year. However, FDI increased by 6.6% in 1999, reaching 2,528.3 million USD, and then decreased from 2000–2001. In 2002, FDI experienced a positive increase of 29.6% compared with the previous year but continued to decline over the next two years. Thus, it can be seen that this is a period when FDI capital fluctuates continuously over the years, increasing and decreasing noncyclically, but the level of decrease is considered not too large, fluctuating approximately 8%/year.

Period 2005–2012: The period 2005–2008 marked a gradual increase in FDI over the years. Specifically, the growth rate of FDI during this period was high, from 3,300.5 million USD in 2005 to 11,500.2 million USD in 2008, with an average growth rate of 46.29% per year. However, in 2009, FDI decreased by 13.05% compared with that in the previous year, reaching 10,000.5 million USD. In 2010, FDI tended to increase again but then decreased slightly over the next two years, reaching 10,046.6 million USD in 2011.

Period 2013–2019: A gradually increasing trend of foreign direct investment in Vietnam was observed over the years. Specifically, in 2013, FDI capital reached 11,500 million USD, an increase of 14.46% compared with the previous year. In 2019, it reached 20,380 million USD, an increase of 6.7% compared with that in 2018. During this period, FDI increased, with an average growth rate of approximately 10.68%.

Period 2020–2023: The COVID-19 pandemic harmed the global economy in general and Vietnam in particular as of the beginning of 2020, which caused FDI investment capital in Vietnam to decline by 2% from the previous year and continue to decline, but only slightly, to 19,740 million USD in 2020. However, the period 2022–2023 shows a positive change when the total amount of FDI capital in Vietnam increases by 13.5% in 2022 compared with 2021. When the global economy and Vietnam gradually recovered after the pandemic, foreign investors continued to invest in Vietnam, leading to an increase in FDI during this period compared with before.

4.1.2. Status of trade openness in Vietnam from 1991–2023

The total import-export turnover, net exports, and trade openness in Vietnam from 1991–2023 are shown in Figure 2.

Period 1991–1997: Export and import turnover in the period 1991–1997 tended to increase gradually over the years. Specifically, export turnover in 1991 reached 2,087.1 million USD, and import turnover reached 2,338.1 million USD. The average growth rates of import and export turnover during this period are 32.04% and 28.21%/year, respectively. Although export and import turnover both tend to increase, the trade balance is in deficit during this period. The trade openness in the period 1991–1997 was low but gradually increased over time, from 0.092 in 1991 to 0.26 in 1997.



Period 1998–2004: The period 1998–2004 continued to mark a gradual increase in export and import turnover over the years. In 1998, export turnover reached 9,360.3 million USD, and import turnover reached 11,499.6 million USD. Export turnover has increased gradually over the years, with an average growth rate of 16.8% per year. The average growth rate of import turnover is 16.34%. Trade openness during this period also tended to increase over the years at a stable pace; specifically, in 1994, trade openness reached 0.24, but by 2004, trade openness was 0.48.

Period 2005–2012: In general, from 2005–2012, export and import turnover increased gradually over the years. Only in 2009 did export turnover decrease by 8.9%, import turnover decline by 13.3%, and trade openness also decreases to 0.76. However, beginning in 2010, export and import turnover and trade openness continued to increase. Notably, 2012 marked the first year in the research period in which Vietnam became a trade surplus country, with a trade balance surplus of 748.8 million US

Period 2013–2019: This period continues to show an increasing trend of export turnover, with an average growth rate of 12.77% per year. Import turnover increased by 12.23% per year. The export growth rate is higher than the import growth rate. However, in 2016, net exports (trade balance) were in continuous surplus, and total net exports tended to increase. In 2016, net exports reached 1,062.4 million USD, but in 2019, net exports reached 10,833.6 million USD, nearly 10 times higher in just year 4.

Period 2020–2023: In 2020, Vietnam's export and import turnover continued to increase. In 2020, Vietnam's total export and import turnover rates were 281,375.76 million USD and 262,268.6 million USD, respectively, with a trade balance surplus. However, net export turnover tended to decline

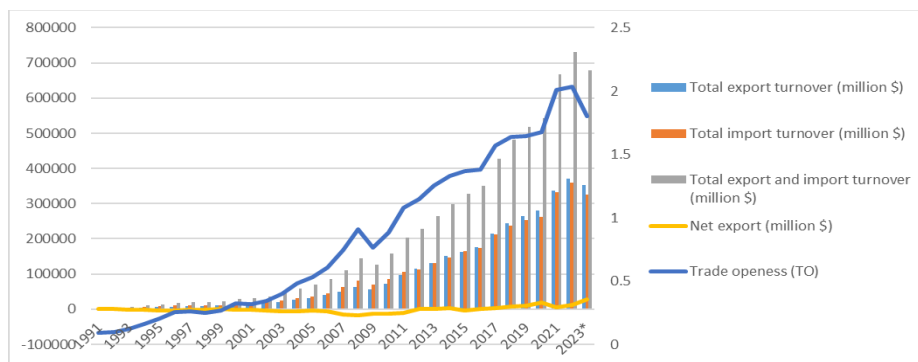


Figure 2 Total exports, import turnover, net exports, and trade openness of Vietnam from 1991–2023. *Source:* GSO, IFS, and research team's calculations

4.1.3. Economic growth developments in Vietnam from 1991–2023

The evolution of real gross domestic product and Vietnam's economic growth from 1991–2023 is shown in Figure 3.

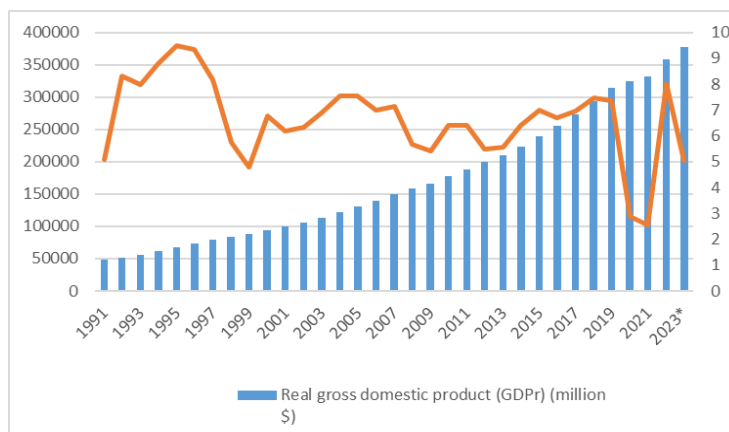


Figure 3 Real gross domestic product and Vietnam's economic growth from 1991–2023. *Source:* GSO, IFS, and research team's calculations.

Period 1991–1997: In 1991–1997, there was an increasing trend in real gross domestic product (GDP_r). In 1991, Vietnam's GDP reached 47,963.52 million USD, growing gradually over the years and reaching 79,035.16 million USD in 1997. The average economic growth rate during this period reached 8.17% per year. Although the economic growth rate during this period did not show a continuous upward trend over the past few years, in general, the main trend was an increase.

Period 1998–2004: In 1998, GDP reached 85,591.1 million USD, and the economic growth rate reached 5.8% of that in the previous year. The GDP tends to increase gradually over time and reached 121,387.7 million USD in 2004, with an economic



growth rate of 7.5%. Vietnam's average economic growth rate in the period 1998–2004 was approximately 6.3%/year, which was lower than that in the previous period but still maintained a positive growth rate, with the main trend increasing over the years.

Period 2005–2012: In 2005, Vietnam's GDP reached 130,549.2 million USD, an increase of 7.5% compared with the previous year. The GDP has increased gradually over time and reached 1,999,081.2 million USD in 2012. The economic growth rate has reached 5.5% since then, even when the world economy has fallen into crisis. The average economic growth rate of this period reached 6.4% per year, a decrease compared with that of the previous period, but it always maintained a positive growth rate.

Period 2013–2019: In 2013, Vietnam's GDP reached 210,137.2 million USD, with an economic growth rate of 5.6% compared with that of the previous year. Vietnam's economic growth rate in this period has gradually increased over the years, averaging 6.8% per year, which is higher than that in the period 2005–2012. In particular, in 2018 and 2019, marked economic growth occurred. The impressive economic growth of Vietnam has reached 7.5% and 7.4% per year. The period 2013–2019 showed that GDP increased, and the economic growth rate tended to accelerate over the years.

Period 2020–2023: Entering 2020, the Vietnamese economy, particularly the world economy, is generally negatively impacted by the COVID-19 pandemic. However, Vietnam's economy is assessed to maintain positive growth. In 2020, GDP reached 323,972.2 million USD, with an economic growth rate of 2.9%, and reached 2.6% in 2021. From 2022–2023, the growth rate of Vietnam's economy reached an impressive 8.0%.

4.2. The relationships among foreign direct investment, trade openness, and Vietnam's economic growth from 1991–2023: A quantitative analysis perspective.

4.2.1. Variables in the model

To consider the impact of foreign direct investment (FDI) and trade openness (TO) on growth in Vietnam, the author uses the VECM model. The VECM model applied in the project is a multivariable model, with 3 endogenous variables: the first difference of real gross domestic product $D(GDP_R)$, first-order difference of trade openness $D(TO)$, first-order difference of total foreign direct investment capital variable $D(FDIHC)$ and the exogenous variable is the difference of the Fed's interest rate variable denoted $D(IFED)$. The variables included in the model are shown in Table 1.

Table 1 Variables in the model.

No.	Symbol	Variable	Data source
1	GDP _r	Endogenous variables Real gross domestic product	TCTK
2	FDIHC	Total adjusted foreign direct investment	IFS, GSO
3	TO	Trade openness	IFS, GSO
4	IFED	Exogenous variables US Federal Reserve interest rate	IFS

Among the variables included in the model, real gross domestic product (GDP_R) represents economic growth. The FDIHC variable has been seasonally adjusted via the moving average method to ensure that shocks reflect changes compared with the long-term trend of that variable. The trade openness variable (TO) is calculated from data on total export turnover (X), total import turnover (IM), and actual gross domestic product. The FED interest rate variable (IFED) is exogenous in the model.

The variables GDP_r , FDIHC, TO, and IFED after the first difference is conducted are denoted as $D(GDP_r)$, $D(FDIHC)$, $D(TO)$, and $D(IFED)$, respectively. With such a model structure, the research team examined the impact of the FDIHC and TO variables on the GDP_r variable.

4.2.2. Considering the stationarity of the variables included in the model

Table 2 Testing the stationarity of variables via the ADF test.

Variable	ADF	Check critical values		
		Significance level 1%	Significance level 5%	Significance level 10%
D(FDIHC)	-1.916471	-3.689194	-2.971853	-2.625121
DGDP _r	-2.100624	-4.273277	-3.557759	-3.212361
DTO	-4.799417	-3.661661	-2.960411	-2.61916
DIFED	-4.694943	-3.661661	-2.960411	-2.61916

Source: Results of data analysis via Eview.

The variables $D(FDIHC)$, $DGDP_r$, DTO , and $DIFED$ do not stop at the 1%, 5%, and 10% significance levels, so these variables are taken into consideration in the next steps in the VECM model.

4.2.3. Determine the optimal delay



To obtain accurate results from the VECM model, in addition to determining the stationarity of the variables, the research team determined the optimal lag of the model. According to the statistical standards LR, FPE, AIC, SC, and HQ, the model has an optimal lag of 2 (Table 3).

Table 3 Determination of the optimal model delay.

VAR Lag Order Selection Criteria
 Endogenous variables: D(FDIHC) D(GDPR) D(TO)
 Exogenous variables: D(IFED)
 Date: 05/26/24 Time: 17:59
 Sample: 1991 2023
 Included observations: 27

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-479.5987	THAT	6.73e+11	35.74805	35.89203	35.79086
1	-432.8366	79.66877	4.13e+10	32.95086	33.52678	33.12211
2	-413.5734	28.53803*	1.99e+10*	32.19062*	33.19850*	32.49032*

* indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.

4.2.4. Granger causality test

According to the results of the Granger causality test, with a significance level of 5%, GDPr has a causal relationship with FDIHC, TO has a causal relationship with FDIHC, TO has a causal relationship with GDPr, and GDPr has a cause and effect relationship with TO.

Table 4 Granger causality test.

Pairwise Granger Causality Tests
 Date: 05/26/24 Time: 18:05
 Sample: 1991 2023
 Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDPR does not Granger Cause FDIHC	28	7.37500	0.0034
FDIHC does not Granger Cause GDPR		0.14115	0.8691
TO does not Granger Cause FDIHC	28	13.1666	0.0002
FDIHC does not Granger Cause TO		0.47862	0.6257
TO does not Granger Cause GDPR	31	6.08649	0.0068
GDPR does not Granger Cause TO		5.43023	0.0107

4.2.5. Cointegration testing

According to the trace test, there is a cointegration relationship between chains; according to the maximum eigenvalue test, there is a cointegration relationship between chains at the 5% significance level. The research team chose the number of cointegration relationships between chains to be 1 at this level of significance.

4.2.6. Test for serial correlation

The test results in Table 6 show that the model does not suffer from serial autocorrelation at the 1% significance level.

4.2.7. Test the normality of the residuals

With a significance level of 5%, the test results (Table 7) show that the residuals are normally distributed, and the Prob values are all greater than 0.05.

4.3. Testing the impact of FDI and TO on economic growth in Vietnam

4.3.1. VECM model estimation results

After checking stationarity, determining the optimal lag, testing Granger causality, testing cointegration, testing serial correlation, and testing the stability of the model, the authors proceed to estimate the model (Table 8).

The VECM model results reveal the relationships among the variables in the model, the influence of the variables in the present study, and the lagged value (optimally delayed by 2 years) of that variable itself, as well as the remaining variables. From this result, the relationships among the variables in the VECM model can be determined: the impacts of foreign investment (FDI) shocks and trade openness (TO) on real gross domestic product (GDPr) (reaction function) can be determined, and the importance of different shocks when explaining variations in the final target variable of economic growth (via variance decomposition) can be evaluated.



Table 5 Cointegration test

Date: 05/26/24 Time: 18:16
 Sample (adjusted): 1998 2023
 Included observations: 26 after adjustments
 Trend assumption: Linear deterministic trend
 Series: D(FDIHC) D(GDPR) D(TO)
 Exogenous series: D(IFED)
 Warning: Critical values assume no exogenous series
 Lags interval (in first differences): 1 to 2
 Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.692179	39.87649	29.79707	0.0025
At most 1	0.242485	9.242297	15.49471	0.3435
At most 2	0.074815	2.021790	3.841466	0.1551

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.692179	30.63420	21.13162	0.0017
At most 1	0.242485	7.220508	14.26460	0.4634
At most 2	0.074815	2.021790	3.841466	0.1551

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p values

Table 6 Serial correlation test.

VEC Residual Serial Correlation LM Tests
 Null Hypothesis: no serial correlation at lag order h
 Date: 05/26/24 Time: 18:18
 Sample: 1991 2023
 Included observations: 26

Lags	LM-Stat	Prob
1	12.07207	0.2093
2	3.961950	0.9139
3	6.929143	0.6445
4	19.76224	0.0194
5	9.580154	0.3855
6	12.65828	0.1787
7	21.07595	0.0123
8	19.60896	0.0205
9	13.65563	0.1351
10	16.35567	0.0598

Probs from chi-square with 9 df.

4.3.2. Reaction function

From the results of the VECM model estimation, the research team considered the reaction function results of GDP over the next 10 years, assuming that foreign direct investment (FDI) and trade openness (TO) fluctuated by 1% in the first year. The results are shown in Figure 4 as follows:

The results show the following:

When FDI fluctuates by 1% in the first year, GDP increases in the next year, then decreases for 2 years before increasing in the following year, then decreases slightly in 1 year, decreases substantially in the next year before increasing sharply in the next 2 years, and then decreases in the last year of the considered 10-year cycle.

When TO fluctuates by 1% in the first year, GDP increases in the next year, decreases slightly in the next year, decreases deeply in 1 year before increasing sharply in 2 years, then decreases deeply in 2 years, then reverses, sharply increases in the following year, and only decreases slightly in the last year of the considered 10 years.



Table 7 Test of normality of residuals.

VEC Residual Normality Tests
 Orthogonalization: Cholesky (Lutkepohl)
 Null Hypothesis: residuals are multivariate normal
 Date: 05/26/24 Time: 18:20
 Sample: 1991 2023
 Included observations: 26

Component	Skewness	Chi-sq	df	Prob.
1	-0.235302	0.239923	1	0.6243
2	-0.850297	3.133024	1	0.0767
3	-0.334313	0.484315	1	0.4865
Joint		3.857263	3	0.2773
Component	Kurtosis	Chi-sq	df	Prob.
1	2.674508	0.114774	1	0.7348
2	3.497545	0.268180	1	0.6046
3	2.197058	0.698443	1	0.4033
Joint		1.081397	3	0.7816
Component	Jarque-Bera	df	Prob.	
1	0.354697	2	0.8375	
2	3.401204	2	0.1826	
3	1.182758	2	0.5536	
Joint	4.938659	6	0.5517	

Table 8 VECM model estimation results.

Vector Error Correction Estimates
 Date: 05/26/24 Time: 18:22
 Sample (adjusted): 1998 2023
 Included observations: 26 after adjustments
 Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1		
D(FDIHC(-1))	1.000000		
D(GDPR(-1))	-0.012793		
D(TO(-1))	-16978.87		
C	598.9094		
Error Correction:	D(FDIHC,2)	D(GDPR,2)	D(TO,2)
CointEq1	-0.530860	-0.530022	5.45E-05
D(FDIHC(-1),2)	0.226687	1.100613	-4.84E-05
D(FDIHC(-2),2)	0.430831	1.070829	-5.24E-05
D(GDPR(-1),2)	-0.021269	-0.361856	-1.23E-05
D(GDPR(-2),2)	-0.035684	-1.029754	6.23E-06
D(TO(-1),2)	-7009.793	2658.104	-0.016561
D(TO(-2),2)	-4235.397	3310.249	-0.253473
C	65.50167	810.6275	0.002878
D(IFED)	-50.80678	596.7784	-0.002686
R-squared	0.488176	0.746139	0.751280
Adj. R-squared	0.247318	0.626676	0.634236

4.3.3. Variance decomposition

In addition to response function analysis, variance decomposition can be used to evaluate the importance of different shocks in explaining variation in the target variable GDP. The results of the variance decomposition analysis are shown in Table 9.

The variation in GDP is almost explained by its factors. In the first year, the FDI factor explains 21.0183% of the variation in GDP, whereas the trade openness factor does not explain the variation in GDP. In the following years, the level of explanation of the GDP factor for its variation decreased, but the level of influence of GDP itself on it remained high, always above 60%, and the level of explanation of the FDI and TO factors was high, with the variation in GDP tending to increase. The FDI variable explains the variation in GDP more than the TO variable does. This shows that foreign direct investment plays an important role in Vietnam's economic growth.



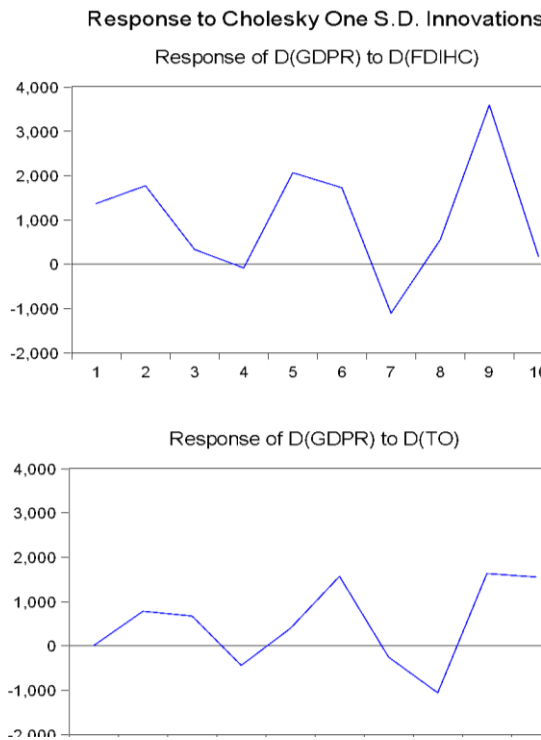


Figure 4 Impact of foreign direct investment (FDI) shock and trade openness (TO) on economic growth.

Table 9 Variance decomposition.

Period	S.E.	D(FDIHC)	D(GDPR)	D(TO)
1	439.8878	21.01830	78.98170	0.000000
2	606.0922	31.33468	64.87222	3.793095
3	810.4036	29.09301	64.92502	5.981978
4	1003.589	27.22294	66.13270	6.644358
5	1094.303	24.84624	71.44145	3.712306
6	1145.915	28.56639	62.56068	8.872937
7	1185.196	28.10735	63.80632	8.086327
8	1225.878	22.06847	69.93197	7.999562
9	1295.256	28.42191	63.43578	8.142318
10	1387.786	24.83291	65.84651	9.320582

Cholesky Ordering: D(FDIHC) D(GDPR) D(TO)

5. Recommendations

Research results suggest the role of maintaining economic growth over the years as a driving force for economic growth in the following years, and at the same time, research supports the view that foreign direct investment (FDI) and trade openness (TO) play important roles in promoting economic growth in Vietnam (g). At the same time, with secondary data collected through running econometric models, the research results are consistent with previous studies in determining the positive impact of TO and FDI on economic growth.

5.1. On the basis of the research results, the research team makes some recommendations to improve the effectiveness of attracting and using FDI, specifically

5.1.1. Improving the investment environment

Simplifying administrative procedures and making the investment licensing process transparent; supporting FDI enterprises in overcoming difficulties in production and business activities, such as facilitating customs clearance of goods and extending licenses for foreign workers

5.1.2. Strengthen investment promotion

Organize international fairs, exhibitions, and seminars to introduce investment opportunities in Vietnam; establish partnerships with international organizations and other countries to attract FDI.



5.1.3. Support domestic business development

Encourage linkages between FDI enterprises and domestic enterprises, creating value chains and increasing domestic added value; create conditions for SMEs to develop and cooperate with FDI enterprises; and attract foreign enterprises to invest in capital, high-tech, advanced, and modern technology to increase the added value per unit of product and participate more deeply in the global value chain.

5.1.4. Develop key industries

Identify and develop key industries with competitive advantages and high potential to attract FDI; encourage FDI enterprises to invest in R&D, innovation, and technology transfer.

5.2. In addition, to promote exports, increase trade openness, and support economic growth, the research team also proposed several recommendations

5.2.1. Diversify export markets

Search for and penetrate new markets, especially potential markets in Africa, Latin America, and the Middle East; sign free trade agreements (FTAs) with major countries and economic regions to minimize tariff and nontariff barriers.

5.2.2. Improving product quality and added value

Encouraging businesses to invest in research and development to improve product quality and technological innovation and building and promoting national brands to create an impression and enhance product competitiveness in the international market.

5.2.3. The competitiveness of businesses

Should be enhanced by organizing in-depth training programs on export skills, international marketing, and supply chain management; providing technical consulting services; and supporting businesses in improving production performance and quality management.

5.2.4. Export support infrastructure should be built

Invest in warehouse systems, seaports, airports, and transportation networks to support the effective transportation of export goods; and strengthen the application of information technology in the management and operation of international trade activities.

5.2.5. Develop supporting industries

Support supporting industries to create products with high added value and reduce dependence on imported raw materials; create close links between businesses in the value chain, from raw material production, and processing to export.

6. Conclusion

The study analyzes the impact of foreign capital flows, trade openness and human capital on Vietnam's economic growth in the period 1991-2023. The ARDL autoregressive lag distribution method is applied to analyze the long-run relationship between variables and Granger causality. The research results show that there is a long-run relationship between foreign capital flows, trade openness, human capital and economic growth. In addition, trade openness, human capital and ODA capital have a positive impact on economic growth, but foreign loans ED are not significant for GDP. Although FDI capital flows have not shown their true role on economic growth when they are statistically significant and have a negative sign, one of the notable findings of the study is the Granger causality impact of FDI capital on economic growth and human capital. This shows that FDI capital is also a factor contributing to promoting productivity and economic growth in Vietnam through positive external impacts on the quality of labor resources for Vietnam. With these research results, the authors found that, in order to achieve sustainable economic growth and escape the middle-income trap that many developing countries are facing, the role of foreign capital, especially ODA capital and FDI capital, also plays an important role in maintaining economic growth. However, Vietnam needs to use aid capital effectively in combination with maintaining a stable macro-economy and finance as well as having reasonable policies in attracting FDI capital to promote export activities as well as improve labor productivity. In addition, policymakers should also realize that they should not rely too much on foreign capital flows because domestic capital sources, trade openness and human capital are also factors contributing to Vietnam's economic growth over the past three decades as research results have demonstrated understanding of the research field and potentially influencing future scientific endeavors.

Ethical considerations

Not applicable.

Conflict of Interest

The authors declare no conflicts of interest.

Funding

This research did not receive any financial support.

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