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Research Article

DETERMINANTS OF FOREIGN DIRECT INVESTMENT IN INDONESIA (2019-2024)

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Abstract: This study examines the determinants of Foreign Direct Investment (FDI) in Indonesia from 2019 to 2024 when COVID-19 was in the intersection - using a quantitative approach and the Vector Error Correction Model (VECM) methodology. The analysis focuses on macroeconomic variables, including Gross Domestic Product (GDP), inflation, interest rates, exchange rates, Human Development Index (HDI), export levels, and Global Economic Policy Uncertainty (GEPU), assessing their short-term and long-term effects on FDI inflows. The findings reveal that in the short term, inflation, exchange rates, and GEPU do not significantly impact FDI. However, in the long term, GDP and HDI exhibit a positive and significant influence on FDI inflows, while interest rates and export levels demonstrate a significant negative effect. These results underscore the critical role of macroeconomic stability, human capital development, and coherent investment policies in attracting and sustaining FDI in Indonesia during the economic recovery phase. The study offers strategic insights for policymakers to optimize Indonesia's investment climate amid global economic uncertainties.

Keywords: Foreign Direct Investment; Macroeconomic Determinants; VECM; HDI; GEPU; Indonesia.
JEL Classification: F21, C32, E22, O16.

1. Introduction

Foreign Direct Investment (FDI) plays a vital role in Indonesia's economic development, contributing to industrial growth, job creation, and technological advancement. The determinants of Foreign Direct Investment (FDI) in Indonesia have garnered significant attention in recent research, highlighting various macroeconomic and institutional factors

that influence investment flows. Suryanta and Patunru (2022) emphasize the importance of market size, labor cost, interest rates, exchange rates, trade openness, and inflation as key macroeconomic determinants of FDI. However, the COVID-19 pandemic (2019-2022) and

the subsequent post-pandemic period (2023-2024) have significantly impacted global FDI patterns. Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by the novel coronavirus SARS-CoV-2.

According to the World Health Organization (WHO), COVID-19 was first identified in December 2019 in Wuhan, China. It rapidly spread across countries and continents, leading the WHO to declare it a global pandemic on March 11, 2020. After more than three years, on May 5, 2023, the WHO officially declared that COVID-19 was no longer a Public Health Emergency of International Concern, although the virus continues to circulate and requires ongoing management. The disease primarily spreads through respiratory droplets and can cause symptoms ranging from mild flu-like illness to severe respiratory distress and death. The emergence of COVID-19 has had profound effects on public health systems, economies, and daily life around the world. In Indonesia, government policies, macroeconomic stability, and investor sentiment have all played key roles in shaping FDI inflows during this period.

Table 1: Indonesia's FDI Data (Tradingeconomics, 2025)

Indonesia's Foreign Direct Investment (in Trillion Rupiah)			
DURING COVID-19		**AFTER COVID-19**	
Mar 1, 2020	98.00	May 1, 2023	186.3
Apr 1, 2020	97.60	Jun 1, 2023	186.3
May 1, 2020	97.60	Jul 1, 2023	196.2
Jun 1, 2020	97.60	Aug 1, 2023	196.2
Jul 1, 2020	106.10	Sep 1, 2023	196.2
Aug 1, 2020	106.10	Oct 1, 2023	184.4
Sep 1, 2020	106.10	Nov 1, 2023	184.4
Oct 1, 2020	111.10	Dec 1, 2023	184.4
Nov 1, 2020	111.10	Jan 1, 2024	204.4
Dec 1, 2020	111.10	Feb 1, 2024	204.4
Jan 1, 2021	111.70	Mar 1, 2024	204.4
Feb 1, 2021	111.70	Apr 1, 2024	217.3
Mar 1, 2021	111.70	May 1, 2024	217.3

During the COVID-19 pandemic, from early 2020 to 2021, global economic uncertainty, travel restrictions, and disrupted supply chains led to a significant decline in FDI flows worldwide (UNCTAD, 2021). This trend is reflected in Indonesia's FDI performance, where data shows that investment values between March 2020 and March 2021 remained relatively low, ranging from IDR 97.6 to 111.7 trillion.

However, following the World Health Organization's declaration on May 5, 2023, that COVID-19 was no longer a global public health emergency, a notable increase in FDI inflows can be observed. From May 2023 onwards, FDI values rose significantly, reaching

as high as 217.3 by May 2024. This rebound indicates the restoration of investor confidence, economic recovery, and the normalization of business operations in the post-pandemic era.

The contrasting trends between the pandemic and post-pandemic periods highlight the direct impact of global health crises on foreign investment behavior and underscore the importance of policy resilience and economic stability in attracting and sustaining FDI.

Understanding the determinants of FDI within the context of such a global crisis is crucial for policymakers, investors, and academics. The disruptions caused by the pandemic altered traditional investment considerations, introducing new risk factors and compelling governments to reassess economic strategies. This study aims to provide a comprehensive analysis of how Indonesia's FDI determinants evolved in response to the pandemic, the effectiveness of policy measures implemented during this period, and the long-term implications for Indonesia's investment climate.

This study is particularly relevant given Indonesia's dependence on FDI for industrial development, infrastructure expansion, and economic diversification. While some economies recovered swiftly, others faced prolonged uncertainty. Indonesia, with its strategic location, abundant natural resources, and emerging digital economy, presents a unique case study for understanding FDI trends in times of crisis and recovery. By analyzing investment patterns from 2019 to 2024, this research aims to uncover the key drivers that sustained or hindered FDI in Indonesia, offering valuable insights for both academic and policy-oriented discussions.

2. Literature Review

FDI (Foreign Direct Investment) is the driver that fundamentally constructs Indonesia's economic growth in all years. Controlling the FDI, some ranges of macroeconomic factors are in play, such as market size by GDP, inflation, exchange rates, global economic uncertainty, human capital quality, trade openness, and interest rates.

GDP as a general measure of a country's market size is one of the substantial determinants of FDI. Large economy is an access to a larger consumer base, investment opportunities, and higher production capacity. The GDP level of a country possesses a significant positive correlation with the inflow of FDI in Indonesia (Astuty, 2021; Wijaya & Dewi, 2022), which marks that a developing economy will attract firms in multinational level to expand their core businesses by considering profitability and stability. Despite GDP level, a country's composition of business sectors and its economic structure are also influential in decision-making of FDI. (Fernández et al., 2020) underlines the tendency of investment concentration on high-growth sectors, which consists of technology and manufacturing industries - therefore indicating GDP level's impact on FDI is dependent on how well a country distributes its economic power throughout different business sectors.

Besides GDP, inflation is also a key investment factor in Indonesia. Inflationary pressure drives down consumer purchasing power, fluctuates price signals, and presents additional uncertainty - hence discouraging investors from offshore. FDI suggests a negative correlation to an above threshold inflation rate (Sumiyati, 2021) as increasing costs & volatility are much more anticipated. (Saragih et al., 2021) also suggest capital outflows and present value of expected profits are diminished as high inflation occurs. However, a moderately controlled inflation is not fully deterring FDI inflow only if economic demand is the key driver. Economic growth is also correlated with inflation (Fitriyah et al., 2022), which

shows production expansion and rising consumer demand. This level and interpretation of inflation can be differentiated whether it is by cost-push (associated with increasing input cost) or by demand-pull (driven by growing economy) - with consideration of extreme inflationary pressure rather deters FDI inflow for longer tenure periods.

Moreover, the exchange rate of a country initiates a currency risk that concerns the most for multinational enterprises that this relationship to FDI is argued broadly in most economic literatures. (Dewi & Hutomo, 2021) argue that Indonesian rupiah with an excessive volatility level shows a negative correlation to investor confidence, therefore indicating a postponed investment decision and/or capital flight. It is only logical for investors to ensure predictable returns and reduce loss on currency exchanges. At the same time, (Susetyo, 2022) indicates a weaker exchange rate is beneficial to export-oriented sectors. A weaker rupiah presents a lower production cost for international companies that operate in Indonesia, which cost-sensitive industries will further consider Indonesia as an attractive investment destination. However, an extended exchange rate instability - although beneficial in leveraging in the short-term, diminishes a country's economic fundamentals (Sangur & Liur, 2022).

Other than macroeconomic factors, an alternative measurement is the Global Economic Policy Uncertainty (GEPU) index in relation to FDI. This index evaluates the uncertainty presented by geopolitical tensions by any means, a particular financial crisis period, and unprecedented governmental policy shifts. Higher economic uncertainty (Siregar & Patunru, 2021) is a leading factor for risk aversion in investors, which reduces Indonesia's incoming FDI. This pattern was present in times of COVID-19 where governments rapidly shifted and responded to a particular event, such as economic disruptions - hence creating a highly volatile investment climate. Contradictorily, (Ameliana & Soebagyo, 2023) FDI inflows have been in recovery period as efforts on stabilizing the post-pandemic economy have been implemented. They argue greater foreign capital tends to be more attracted by clear and transparent policies even in times of high global uncertainty.

Likewise, trade openness and export rate are crucial factors to FDI decision as the particular country ought to be within the global trade networks. Nations with greater export rates have greater tendencies to draw larger FDI inflow as the country is characterized by lower trade barriers, effective infrastructure management, and established trade relationships amongst countries (Anindita et al., 2021). (Rachel Pradita et al., 2024) also highlight global supply chains that have greater support, such as massive foreign investments, towards export-oriented sectors - such as natural resource and manufacturing chains. For Indonesia, the special economic zones (SEZs) and other trade agreements in actuality improve Indonesia's attractiveness for FDI inflow through incentives in taxation and investment costs. Yet, these policies should remain regularly evaluated should regulatory uncertainties occur in the future.

Not only from a pure economics perspective, the Human Development Index (HDI) as a socioeconomic factor is also a contributing piece. It is an advancement of the conservative FDI drivers as human capital alongside decent standards of living become relevant. Budiono and Purba (2023) argue that there is a positive significant correlation between electricity, water, HDI, and COVID-19 pandemic towards the predictors of FDI. They believe better reprioritization of the Indonesian government's policies of infrastructure development, education programs, and electricity distribution are crucial in inviting FDI inward. Moreover, HDI is major towards FDI's flow as it enforces productive environments, leading to the

prosperity of a nation. Mayar and Majewska (2023) also argue that Foreign Direct Investments are positively correlated with the Human Development Index, which is generally assumed that this reciprocal relationship is substantial towards a region/nation's economic growth.

Last but not least, interest rates. This factor contributes to FDI changes in duality. (Susetyo, 2022) shows that a rising interest rate scenario in Indonesia discourages investment from both on- and off-shore, therefore presenting a negative correlation towards FDI inflows - as it increases the borrowing costs that leads to reduced investment attractiveness at a longer period scheme. On the other hand, (Koesoemasari et al., 2022) suggest an alternative where increasing interest rates draw FDI in forms of portfolio instead of direct investments. However, it is only bound to short-term inflows that stabilize reserves of foreign exchange - which in the long term, is insignificant to economic development.

3. Methods

3.1 Theoretical Framework

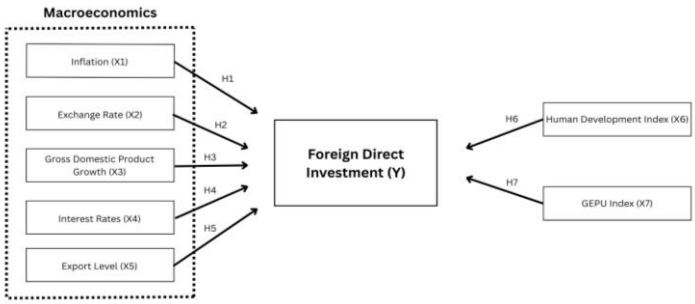

Figure 1: Theoretical Framework

Foreign Direct Investment (FDI) serves as a critical driver of economic growth, facilitating industrialization, employment generation, and technological advancements. The inflow of FDI, however, is contingent upon various macroeconomic determinants, including Gross Domestic Product (GDP), inflation, interest rates, exchange rate stability, the Human Development Index (HDI), trade openness, and Global Economic Policy Uncertainty (GEPU). Dunning's Eclectic Paradigm (OLI Model) (1980) posits that foreign investment decisions are shaped by three key factors: Ownership Advantage (O), Location Advantage (L), and Internalization Advantage (I). This study emphasizes Location Advantage, as macroeconomic stability and policy consistency significantly influence investor confidence. In classical macroeconomic theory, Keynes (1936) asserts that investment behavior is primarily dictated by profit expectations and interest rate fluctuations. Robust GDP growth signals higher profitability, whereas uncontrolled inflation introduces uncertainty, thereby diminishing investment appeal (Sumiyati, 2021).

Furthermore, the Interest Rate Parity (IRP) theory suggests that elevated interest rates can attract foreign capital; however, such conditions simultaneously escalate financing costs for domestic enterprises. Empirical findings by (Susetyo, 2022) indicate that rising interest rates in Indonesia predominantly attract portfolio investment rather than FDI, highlighting the nuanced relationship between monetary policy and investment flows. In addition, the

Exchange Rate Expectation Theory underscores that exchange rate stability is a decisive factor in FDI attractiveness, as excessive volatility exacerbates investor risk exposure (Dewi & Hutomo, 2021). Conversely, currency depreciation can enhance the competitiveness of export-oriented industries, thereby augmenting FDI inflows into the manufacturing sector.

Beyond macroeconomic fundamentals, GEPU serves as an exogenous factor influencing investment patterns. Uncertainty in global economic policies, trade disputes, and financial crises may induce capital flight and deter foreign investors from committing to long-term ventures (Siregar & Patunru, 2021). Moreover, human capital quality, as measured by HDI, is instrumental in shaping investor preferences, as nations with skilled labor forces and advanced infrastructure offer more conducive environments for sustainable FDI expansion (UNDP, 2022). Finally, trade openness and global supply chain integration remain pivotal determinants of foreign capital inflows, as evidenced by empirical research indicating a positive correlation between export performance and FDI attraction (Rachel Pradita et al., 2024).

This study underscores the multifaceted dynamics governing FDI inflows into Indonesia, offering a comprehensive analysis of the interplay between macroeconomic stability, policy frameworks, and investor sentiment. The findings contribute to policy discourse by elucidating strategies to enhance Indonesia's investment climate, thereby fostering long-term economic resilience and global competitiveness.

3.2 Research Approach

This study adopts a quantitative research methodology with secondary data analysis. Data is collected from academic publications, economic reports, and official sources such as Bank Indonesia, BPS, the World Bank, and UNCTAD. The focus is to empirically assess the macroeconomic determinants influencing Foreign Direct Investment (FDI) flows in Indonesia from 2019 to 2024. Given the significant variance in data magnitudes (e.g., FDI and Export figures being substantially large, while GDP, Interest Rate, and Inflation are in percentage form), all variables are transformed using natural logarithms (Ln) to ensure a linear relationship.

3.3 Data Analysis Method

A time series regression model is employed to examine the relationship between economic indicators and FDI inflows. The regression equation follows prior research frameworks:

$$\Delta FDIt = \alpha + \gamma\ (FDIt\text{-}1 - \beta1Inflation\text{-}1 - \beta2Exchange\ Ratet\text{-}1 - \beta3GDPt\text{-}1 - \beta4Interest\ Rate\text{-}1 - \beta5Export\ Ratet\text{-}1 - \beta6HDIt\text{-}1 - \beta7GEPUt\text{-}1) + i{=}1k\delta i\Delta Xi + t$$

Where:

- $\Delta FDIt$ is the First difference of FDI, representing short-term changes.
- α is the intercept, capturing the baseline FDI level when all other variables are zero.
- γ measures the speed of adjustment to long-run equilibrium and confirms convergence.
- $\beta1,\beta2,....,\beta7$ Indicate the marginal effect of each independent variable on FDI.

- FDIt-1 - β1Inflation-1 - ..... - β7GEPUt-1 represents deviations from long-run equilibrium.
- $\sum_{=1}$ □□□□□ captures short-run dynamics, showing how changes in independent variables affect FDI temporarily.
- t is the error term, accounting for random shocks

.

Data processing is performed using EViews software to ensure the stability of regression estimations and hypothesis testing. The study employs the Vector Error Correction Model (VECM) to examine both short-run dynamics and long-run equilibrium relationships. VECM is particularly suitable for time-series data exhibiting cointegration, as it allows for short-term deviations to be corrected while maintaining alignment with long-term trends. The analytical process involves the following steps:

1. Stationarity Test:

Unit root tests (ADF-Fisher Test) are conducted to determine whether variables are stationary. If variables are non-stationary at the level but become stationary at the first difference, this justifies the need for further cointegration analysis.

2. Lag Optimum:

The Lag Optimum VAR Test determines the ideal number of past time periods (lags) to include in the model. This ensures that the model captures the necessary historical data for accurate predictions without overcomplicating the analysis.

3. Stability Test:

Roots of the Characteristic Polynomial checks whether the VAR model is stable over time. Stability is crucial for making reliable predictions. By examining the roots of the characteristic polynomial, the test ensures that all roots lie inside the unit circle.

4. Granger Causality Test:

The Granger Causality Test is employed to examine whether one time series can predict another. This test determines the direction of causality between variables by assessing whether past values of one variable contain predictive information about another.

5. Cointegration Test:

The Johansen Cointegration Test is applied to determine whether a long-run equilibrium relationship exists among the variables. If cointegration is detected, ECM is implemented to model both short-run fluctuations and long-run adjustments.

6. VECM Model Estimation:

This study applies the Vector Error Correction Model (VECM) to analyze short-term dynamics and long-run equilibrium among economic variables. Its error correction mechanism quantifies the speed of adjustment to equilibrium after shocks, with a negative and significant coefficient indicating stability. By incorporating lagged differences, VECM captures short-run fluctuations while maintaining long-run cointegration. Furthermore, both t-tests and F-tests are employed to evaluate the statistical significance of individual variables (t-test) and the joint explanatory power of the model (F-test), ensuring robustness in identifying the determinants of FDI inflows.

7. Classical Assumption Tests:

- Normality Test: The Jarque-Bera test is applied to residuals, confirming normality if the p-value > 0.05.

- Heteroskedasticity Test: Evaluated using a Joint Chi-square Test on VEC residuals, with p-value > 0.05, indicating no evidence of heteroskedasticity.
- Autocorrelation Test: Conducted using the Portmanteau Test, with a p-value > 0.05 indicating no autocorrelation.

3.4 Research Hypotheses

The study tests the following hypotheses:
H1: Inflation negatively impacts FDI inflows.
H2: Exchange rate fluctuations significantly influence FDI.
H3: GDP positively correlates with FDI inflows.
H4: Interest rates significantly affect FDI decisions.
H5: Higher export levels lead to increased FDI.
H6: Human Development Index (HDI) positively influences FDI inflows.
H7: GEPU index impacts investor confidence and FDI inflows.

3.5 Research Limitations

While this study provides empirical insights into FDI determinants using the VECM approach, certain limitations remain. The VECM focuses on capturing the long-run and short-run relationships between variables but may not fully account for qualitative factors such as investor sentiment, sudden policy shifts, or geopolitical risks. Additionally, the model's reliance on historical data might overlook real-time market dynamics. Despite these limitations, this research lays a solid foundation for future studies on the interplay between economic policies and investment dynamics.

4. Results and Discussion

This study employs regression analysis techniques and the Error Correction Model (ECM) to examine both the short-term and long-term effects of foreign direct investment (FDI) on inflation, exchange rates, GDP, interest rates, export levels, the Human Development Index (HDI), and the Global Economic Policy Uncertainty (GEPU) index. The research follows a systematic testing procedure, as outlined below:

4.1 Stationarity Test

Group unit root test: Summary
Series: X1, X2, X3, X4, X5, X6, X7, Y
Date: 03/27/25 Time: 16:49
Sample: 2019M01 2024M12
Exogenous variables: None
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-18.2889	0.0000	7	486
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	802.999	0.0000	7	486
PP - Fisher Chi-square	1089.63	0.0000	7	490

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Figure 2. Stationarity Test Results at First Difference Output
Source: Team Analysis

Based on the testing, all variables were stationary at First Difference / I(1) as the: 1) Levin, Lin & Chu; 2) ADF Chi-Square; and 3) Fisher Chi-Square Test indicate <0.05 probability with all tests being ≤ 0.0000 (see **Figure 2**). There were no signs of stationarity in Second Difference / I(2) that could be proceeded onto the Autoregressive Distributed Lag (ARDL) or Vector Error Correction Model (VECM) by firstly conducting the Lag Optimum Test.

4.2 Lag Optimum Test

Lag Optimum Test in reference to information provided by AIC, SC, and HQ showed Lag = 1 was the most optimum, as all AIC, SC, and HQ's values were the lowest amongst all lag values (see **Figure 3**). This will be used for the amount of lags required in the VECM test.

VAR Lag Order Selection Criteria
Endogenous variables: D(Y) D(X1) D(X2) D(X3) D(X4) D(X5) D(X6) D(X7)
Exogenous variables:
Date: 03/27/25 Time: 16:45
Sample: 2019M01 2024M12
Included observations: 66

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-2391.633	NA	2.89e+22*	74.41311*	76.53641*	75.25213*
2	-2345.567	69.79714	5.34e+22	74.95656	79.20317	76.63460
3	-2270.346	95.73559*	4.64e+22	74.61654	80.98644	77.13359
4	-2206.197	66.09314	7.12e+22	74.61202	83.10522	77.96809
5	-2137.607	54.04005	1.43e+23	74.47295	85.08945	78.66803

* 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

Figure 3. Lag Optimum Test Output
Source: Team Analysis

4.3 Stability Test (Vector Autoregression)

Roots of Characteristic Polynomial
Endogenous variables: D(Y) D(X1) D(X2) D(X3) D(X4) D(X5) D(X6) D(X7)
Exogenous variables:
Lag specification: 1 1
Date: 03/27/25 Time: 16:45

Root	Modulus
0.601593	0.601593
-0.407378 - 0.167209i	0.440359
-0.407378 + 0.167209i	0.440359
0.070549 - 0.241707i	0.251793
0.070549 + 0.241707i	0.251793
-0.016295 - 0.073882i	0.075657
-0.016295 + 0.073882i	0.075657
0.019515	0.019515

No root lies outside the unit circle.
VAR satisfies the stability condition.

The stability test indicated that the VAR for all variables are within the circles as indicated by the value of each modulus, being < 1.0; therefore, showing a stable VAR that is fully appropriate for VECM to be used.

Figure 4: **Vector Autoregression for Stability Test**
Source: Team Analysis

4.4 Granger Causality

Pairwise Granger Causality Tests
Date: 03/27/25 Time: 16:46
Sample: 2019M01 2024M12
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
X2 does not Granger Cause X1	71	1.65916	0.2021
X1 does not Granger Cause X2		0.36115	0.5499
X3 does not Granger Cause X1	71	0.04161	0.8390
X1 does not Granger Cause X3		0.34414	0.5594
X4 does not Granger Cause X1	71	6.78250	0.0113
X1 does not Granger Cause X4		24.6865	5.E-06
X5 does not Granger Cause X1	71	4.66791	0.0343
X1 does not Granger Cause X5		0.79850	0.3747
X6 does not Granger Cause X1	71	1.41975	0.2376
X1 does not Granger Cause X6		1.93556	0.1687
X7 does not Granger Cause X1	71	0.24852	0.6197
X1 does not Granger Cause X7		0.04709	0.8289
Y does not Granger Cause X1	71	0.28588	0.5946
X1 does not Granger Cause Y		0.09501	0.7588

Figure 5.1: Granger Causality (1)

X3 does not Granger Cause X2	71	12.3923	0.0008
X2 does not Granger Cause X3		2.00731	0.1611
X4 does not Granger Cause X2	71	1.29188	0.2597
X2 does not Granger Cause X4		18.8390	5.E-05
X5 does not Granger Cause X2	71	2.95091	0.0904
X2 does not Granger Cause X5		0.07415	0.7862
X6 does not Granger Cause X2	71	13.4567	0.0005
X2 does not Granger Cause X6		1.60259	0.2099
X7 does not Granger Cause X2	71	5.03814	0.0281
X2 does not Granger Cause X7		0.35867	0.5512
Y does not Granger Cause X2	71	14.1714	0.0004
X2 does not Granger Cause Y		0.00020	0.9887
X4 does not Granger Cause X3	71	1.13368	0.2908
X3 does not Granger Cause X4		21.2189	2.E-05
X5 does not Granger Cause X3	71	7.48463	0.0079
X3 does not Granger Cause X5		3.91555	0.0519
X6 does not Granger Cause X3	71	1.83385	0.1802
X3 does not Granger Cause X6		6.53825	0.0128

Figure 5.2: Granger Causality (cont.)

X7 does not Granger Cause X3	71	0.31414	0.5770
X3 does not Granger Cause X7		0.08918	0.7661
Y does not Granger Cause X3	71	0.93072	0.3381
X3 does not Granger Cause Y		2.72440	0.1034
X5 does not Granger Cause X4	71	32.7034	3.E-07
X4 does not Granger Cause X5		0.64530	0.4246

X7 does not Granger Cause X6	71	0.06113	0.8055
X6 does not Granger Cause X7		0.27437	0.6021
Y does not Granger Cause X6	71	3.23684	0.0764
X6 does not Granger Cause Y		1.43353	0.2353
Y does not Granger Cause X7	71	0.00341	0.9536
X7 does not Granger Cause Y		0.14989	0.6999

X6 does not Granger Cause X4	71	7.33492	0.0085
X4 does not Granger Cause X6		0.11847	0.7318
X7 does not Granger Cause X4	71	0.60495	0.4394
X4 does not Granger Cause X7		0.03139	0.8599
Y does not Granger Cause X4	71	16.8113	0.0001
X4 does not Granger Cause Y		0.90673	0.3444
X6 does not Granger Cause X5	71	2.12373	0.1496
X5 does not Granger Cause X6		3.17017	0.0795
X7 does not Granger Cause X5	71	3.07793	0.0839
X5 does not Granger Cause X7		0.01433	0.9051
Y does not Granger Cause X5	71	2.91424	0.0924
X5 does not Granger Cause Y		4.00840	0.0493

Figure 5.3: Granger Causality (cont.)

Figure 5.4: Granger Causality (cont.)

Source: Team Analysis

Based on the Granger Causality Test, there were some significant relationships between both dependent and independent variables. For instance, variable X4 (Interest Rate) and variable X1 (Inflation) simultaneously influenced each other whereas Y (FDI) was significantly influencing X4 (Interest Rate) and X2 (Exchange Rate). However, not all variables demonstrated significant correlations. Therefore, it rather indicates there was a short-term relationship between the variables.

4.5 Cointegration Test

None *	0.691286	324.9873	159.5297	0.0000
At most 1 *	0.649502	243.8889	125.6154	0.0000
At most 2 *	0.528751	171.5493	95.75366	0.0000
At most 3 *	0.409440	119.6358	69.81889	0.0000
At most 4 *	0.372773	83.29452	47.85613	0.0000
At most 5 *	0.307885	51.10965	29.79707	0.0001
At most 6 *	0.212537	25.71739	15.49471	0.0010
At most 7 *	0.125215	9.230601	3.841466	0.0024

Trace test indicates 8 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 (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**

Figure 6: Cointegration Test Output
Source: Team Analysis

Based on the result of the Johanssen Cointegration Test, all 8 variables displayed significant cointegration relationships as indicated by the all probability values being < 0.05. By that, this showed that all variables held a strong and valid long-term correlation, which, added by the output of Granger-Causality, successfully fitted the criteria to proceed onto the VECM model.

4.6 VECM Test

After conducting several tests, the VECM estimation results have been obtained. The findings are presented in the following table:

Vector Error Correction Estimates
Date: 03/27/25 Time: 16:47
Sample (adjusted): 2019M04 2024M12
Included observations: 69 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
D(Y(-1))	1.000000
D(X1(-1))	-15.13842 (30.0225) [-0.50424]
D(X2(-1))	0.018329 (0.03014) [0.60808]
D(X3(-1))	0.000951 (0.00016) [6.01826]
D(X4(-1))	-147.3437 (54.9495) [-2.68144]
D(X5(-1))	-0.083969 (0.00910) [-9.22334]
D(X6(-1))	120.7762 (59.2627) [2.03798]
D(X7(-1))	-0.059990 (0.33126) [-0.18110]
C	-20.43957

Error Correction:	D(Y,2)	D(X1,2)	D(X2,2)	D(X3,2)	D(X4,2)	D(X5,2)	D(X6,2)	D(X7,2)
CointEq1	-0.048404 (0.01079) [-4.48705]	0.000259 (0.00056) [0.46006]	-0.681219 (0.77548) [-0.87845]	-495.6858 (141.976) [-3.49134]	-0.000260 (0.00019) [-1.36072]	18.26967 (2.85049) [6.40932]	-0.001105 (0.00037) [-2.94937]	0.160824 (0.07730) [2.08052]
D(Y(-1),2)	-0.454888 (0.11916) [-3.81732]	-0.013078 (0.00622) [-2.10349]	-5.262032 (8.56641) [-0.61426]	849.7111 (1568.34) [0.54179]	0.003315 (0.00211) [1.56866]	-51.82688 (31.4881) [-1.64592]	0.000167 (0.00414) [0.04039]	0.082040 (0.85390) [0.09608]
D(X1(-1),2)	1.055571 (2.04897) [0.51517]	-0.563630 (0.10690) [-5.27241]	-15.83916 (147.295) [-0.10753]	5938.027 (26966.9) [0.22020]	-0.066174 (0.03634) [-1.82103]	106.7289 (541.423) [0.19713]	-0.043853 (0.07119) [-0.61598]	24.72452 (14.6824) [1.68396]
D(X2(-1),2)	0.002607 (0.00177) [1.47384]	5.02E-05 (9.2E-05) [0.54417]	-0.324790 (0.12715) [-2.55445]	-2.346345 (23.2781) [-0.10080]	4.08E-05 (3.1E-05) [1.30218]	-0.367897 (0.46736) [-0.78718]	4.87E-05 (6.1E-05) [0.79244]	0.005268 (0.01267) [0.41565]
D(X3(-1),2)	7.68E-06 (9.0E-06) [0.85060]	2.10E-07 (4.7E-07) [0.44626]	-0.000101 (0.00065) [-0.15492]	-0.341697 (0.11882) [-2.87578]	-1.31E-07 (1.6E-07) [-0.81511]	-0.006029 (0.00239) [-2.52739]	2.24E-07 (3.1E-07) [0.71274]	-9.83E-05 (6.5E-05) [-1.51887]
D(X4(-1),2)	-13.67313 (7.02895) [-1.94526]	0.473722 (0.36672) [1.29177]	-1146.323 (505.293) [-2.26863]	-39919.87 (92509.4) [-0.43152]	-0.174135 (0.12466) [-1.39689]	-24.81236 (1857.34) [-0.01336]	-0.210497 (0.24422) [-0.86192]	63.34950 (50.3676) [1.25774]
D(X5(-1),2)	-0.002270 (0.00058) [-3.94406]	3.86E-05 (3.0E-05) [1.28479]	-0.045696 (0.04138) [-1.10439]	-12.38201 (7.57527) [-1.63453]	-9.67E-06 (1.0E-05) [-0.94737]	0.147839 (0.15209) [0.97204]	-4.99E-05 (2.0E-05) [-2.49619]	0.011933 (0.00412) [2.89330]
D(X6(-1),2)	2.661154 (3.36283) [0.79134]	0.228354 (0.17545) [1.30153]	316.5490 (241.745) [1.30943]	28607.41 (44258.8) [0.64637]	-0.101311 (0.05964) [-1.69871]	-2471.468 (888.597) [-2.78131]	-0.440429 (0.11684) [-3.76947]	-38.27484 (24.0971) [-1.58836]
D(X7(-1),2)	-0.013128 (0.01363) [-0.96333]	-0.000491 (0.00071) [-0.68991]	-1.943332 (0.97967) [-1.98366]	50.45312 (179.358) [0.28130]	-3.30E-05 (0.00024) [-0.13670]	4.065097 (3.60103) [1.12887]	-0.001002 (0.00047) [-2.11599]	-0.626301 (0.09765) [-6.41352]
C	0.059031 (0.89305) [0.06610]	0.004729 (0.04659) [0.10149]	8.192791 (64.1993) [0.12762]	-21.00746 (11753.6) [-0.00179]	0.000444 (0.01584) [0.02802]	-45.50352 (235.981) [-0.19283]	0.003625 (0.03103) [0.11682]	1.081991 (6.39939) [0.16908]

R-squared	0.467105	0.393413	0.304279	0.475246	0.184916	0.709493	0.364686	0.550064
Adj. R-squared	0.385816	0.300883	0.198152	0.395199	0.060581	0.665179	0.267774	0.481430
Sum sq. resids	3239.288	8.817547	16739977	5.61E+11	1.018855	2.26E+08	3.910484	166330.3
S.E. equation	7.409668	0.386588	532.6616	97520.08	0.131411	1957.939	0.257448	53.09573
F-statistic	5.746221	4.251722	2.867127	5.937071	1.487243	16.01039	3.763053	8.014428
Log likelihood	-230.6973	-26.92774	-525.6793	-885.1643	47.52548	-615.5008	1.123605	-366.5798
Akaike AIC	6.976734	1.070369	15.52694	25.94679	-1.087695	18.13046	0.257287	10.91536
Schwarz SC	7.300518	1.394153	15.85072	26.27057	-0.763911	18.45424	0.581070	11.23914
Mean dependent	2.06E-16	0.001594	1.782609	0.000000	0.000000	-31.82609	0.000000	-0.484928
S.D. dependent	9.454737	0.462352	594.8473	125397.2	0.135582	3383.706	0.300862	73.73199

Determinant resid covariance (dof adj.)	9.21E+22
Determinant resid covariance	2.63E+22
Log likelihood	-2564.299
Akaike information criterion	76.87824
Schwarz criterion	79.72754
Number of coefficients	88

Figure 7: VECM Estimation Results
Source: Team Analysis

The estimation results from the Vector Error Correction Model (VECM) reveal distinct short-term and long-term relationships among the economic variables influencing Foreign Direct Investment (FDI) (Y). In the short run, Inflation (X1), Exchange Rate (IDR) (X2), and Global Economic Policy Uncertainty (GEPU) (X7) are statistically insignificant, as their t-statistics (-0.50424, 0.60808, and -0.18110, respectively) fall within the acceptance range of -1.99 to 1.99 at a 5% significance level. This indicates that these variables do not exert an immediate effect on FDI fluctuations.

In contrast, the long-term results confirm the presence of a stable equilibrium relationship. The Error Correction Term (ECT) is negative and statistically significant, with a coefficient of -0.048404 and a t-statistic of -4.48705, exceeding the critical value of -1.99. This signifies that approximately 4.8% of deviations from the long-run equilibrium are corrected each period, reinforcing the model's validity in capturing long-term adjustment dynamics. Moreover, the results indicate that FDI maintains a stable long-term relationship with all independent variables, further validating the appropriateness of VECM in analyzing cointegrated economic relationships.

Several variables exhibit significant long-term effects on FDI. Gross Domestic Product (GDP) (X3) has a significant positive impact (t-statistic: 6.01826), underscoring its role as a key driver of foreign investment. Similarly, the Human Development Index (HDI) (X6) exerts a positive and significant effect (t-statistic: 2.03798), suggesting that improvements in human capital contribute to attracting investment inflows. Conversely, Interest Rate (X4) (t-statistic: -2.68144) and Export Level (X5) (t-statistic: -9.22334) exhibit significant negative effects, indicating that higher interest rates and export activities may deter foreign investment in the long run.

In addition to the individual significance tests (t-tests), the model's overall explanatory power is evaluated using F-tests. The F-statistic for the equation with FDI as the dependent variable is 5.746, indicating that the explanatory variables jointly have a statistically significant impact on FDI at the 5% level. This strengthens the robustness of the model by confirming that the set of independent variables can explain variations in FDI inflows. The significance of both the t-tests and F-tests affirms the reliability of the VECM in capturing the dynamic interplay between macroeconomic indicators and FDI behaviour.

4.7 Classical Assumption Tests

4.7.1 Normality Test

Component	Jarque-Bera	df	Prob.
1	8.802713	2	0.0123
2	1.558447	2	0.4588
3	502.6075	2	0.0000
4	1.637249	2	0.4410
5	0.208911	2	0.9008
6	15.65292	2	0.0004
7	640.9745	2	0.0000
8	0.867044	2	0.6482
Joint	1172.309	16	0.0000

Figure 8: Normality Test Results
Source: Team Analysis

Most of the residuals do not follow a normal distribution, particularly components 3, 6, and 7, as indicated by the high Jarque-Bera statistic and a p-value of 0.015776, which is below the 5% significance level (0.05). This indicates that the model violates the normality assumption. However, despite failing the normality test, the data is still used since it adheres to the other classical linear regression assumptions, and a sample size of 72 is considered more than sufficient for robust statistical analysis.

4.7.2 Heteroskedasticity Test

Joint test:

Chi-sq	df	Prob.
698.2092	648	0.0840

Figure 9: Heteroskedasticity Test Results
Source: Team Analysis

The Joint Chi-square Test on VEC residuals test results reveal no evidence of heteroskedasticity in the model. Since the probability value of 0.084 is still above 5% exceeding the conventional significance level, indicating that the null hypothesis of no heteroskedasticity cannot be rejected.

4.7.3 Autocorrelation Test

VEC Residual Portmanteau Tests for Autocorrelations
Null Hypothesis: No residual autocorrelations up to lag h
Date: 03/27/25 Time: 16:54
Sample: 2019M01 2024M12
Included observations: 69

Lags	Q-Stat	Prob.*	Adj Q-Stat	Prob.*	df
1	47.58771	---	48.28753	---	---
2	118.1251	0.5313	120.9305	0.4590	120

Figure 10: Autocorrelation Test Results
Source: Team Analysis

In this study, autocorrelation was examined using the Portmanteau Test. According to the table, There is no significant autocorrelation up to lag 2, as the probability values (0.5313 and 0.4590) are higher than the 5% significance level (0.05). This indicates that the model's residuals are free from autocorrelation.

5. Conclusions and Recommendations

Based on the VECM estimation results, it can be concluded that in the short run, variables such as inflation, exchange rate, and global economic policy uncertainty (GEPU) do not have a significant impact on Foreign Direct Investment (FDI). This indicates that foreign investors do not immediately respond to temporary economic fluctuations, as investment decisions are generally driven by structural factors and long-term economic prospects rather than short-term volatility.

Conversely, in the long run, FDI demonstrates a stable and significant relationship with all independent variables, as reflected in the significance of the Error Correction Term (ECT). Both Gross Domestic Product (GDP) and the Human Development Index (HDI) show a positive and statistically significant effect on FDI, reaffirming the role of economic growth and human capital quality as primary drivers of long-term foreign investment. Investors tend to be more attracted to countries with high growth potential and a skilled labor force, as these factors enhance productivity and ensure investment sustainability.

Meanwhile, interest rates and export levels exhibit a significant negative influence on FDI. High interest rates can increase the cost of capital and signal underlying macroeconomic risks, discouraging foreign investment. Likewise, high export activity may suggest market saturation or heavy dependence on external demand, which could increase uncertainty for investors—particularly in times of global economic slowdown or trade disruptions. These findings underscore the importance of maintaining domestic macroeconomic stability, investing in human capital development, and fostering a

competitive and predictable investment climate as key strategies to attract and sustain long-term foreign direct investment.

The F-test results, with an F-statistic of 5.746, indicate that the independent variables, when considered together, significantly impact Foreign Direct Investment (FDI). This highlights that FDI is driven by a combination of macroeconomic factors, and the model effectively captures their collective influence. The significance of the F-test reinforces the idea that a comprehensive understanding of FDI requires considering the joint effect of multiple economic variables, rather than isolated ones, providing a more accurate picture of foreign investment behavior.

The study provides essential recommendations for policymakers and academic researchers. Policymakers are urged to implement macroeconomic policies that prioritize economic stability, human capital development, and investor confidence to mitigate the adverse effects of high interest rates and export saturation on FDI. Enhancing economic infrastructure and maintaining consistent investment policies are critical strategies for sustaining foreign investment amid global uncertainties. For academic researchers, further investigation into sector-specific FDI dynamics and comparative analyses with other emerging markets in Southeast Asia could yield valuable insights into optimizing investment strategies and policy frameworks in the context of economic recovery and post-pandemic development.

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