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NEXUS BETWEEN CAPITAL INFLOW AND ECONOMIC GROWTH: EVIDENCE FROM INDONESIA

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ABSTRACT

This research aims to examine the impact of capital inflow, specifically Foreign Direct Investment (FDI) and Portfolio Investment, on economic growth in Indonesia as an emerging market country. The study uses quarterly time series data from 2004 to 2021 and employs the Vector Error Correction Model (VECM) method to analyse the relationship between capital inflow and economic growth. The results show that FDI has a substantial impact on GDP in the short to middle term, while portfolio investment does not contribute as expected to boost economic growth. The instability of Indonesian political conditions and the U.S. economy's power could create "crowd out" when economic shocks occur. The forecasting analysis result of the main interest variable (FDI and Portfolio Investment) shows that Indonesian GDP will increase yearly in the long term, while Foreign Direct Investment and Portfolio Investment have a steady growth condition. This article contributes to the ongoing academic debate about the relationship between capital inflow and economic growth, as previous literature shows different results in developed and developing nations. The research will contribute to answering the question of how capital inflow plays a role in growing economies such as Indonesia in the long term.

Keywords: Capital inflow, Foreign Direct Investment, Portfolio investment, Economic growth, VECM model

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INTRODUCTION

Capital inflows from high-income nations to middle-income nations underscore the significance of international trade (Jhingan, 2016). These inflows, often reflected in the trade balance, enhance a country's ability to engage in trade by increasing imports and exports of goods and services. Igan (2016) notes that capital inflows have the potential to increase access to finance, thereby boosting the quantity of available capital and reducing interest rates (cost of borrowing); therefore, industries in countries receiving substantial capital inflows are likely to experience disproportionate growth compared to their counterparts. This phenomenon is particularly critical for Indonesia, as it serves as a vital impetus to stimulate its economy, foster economic growth and contribute to overall national welfare.

As an emerging market economy with a high Gross Domestic Product (World Bank, 2022), Indonesia is projected to become the fourth-largest economy in the world by 2030. This anticipated growth invites a thorough and comprehensive examination of capital inflows, which are increasingly recognised as a critical factor in shaping the economic landscapes of emerging regions. Exploring this phenomenon provides valuable insights into the dynamics driving the economies of these rapidly developing areas.

Based on data from the Indonesian Bureau of Statistics (Badan Pusat Statistik, 2023) since 2012, Indonesia's trade balance has consistently been negative. Indonesia grapples with the complexities of its current economic predicament, stemming from heightened imports of goods and services, economic crises in fellow nations (Argentina and Turkey), and the trade tensions between the U.S. and China. This challenge is exacerbated by the significant reliance on the U.S. and China as Indonesia's primary trading partners. To resolve this issue, it is essential to increase the flow of capital from abroad to support Indonesia's economic growth. This cash flow, commonly referred to as Capital Inflow, presents an intriguing subject for exploring the dynamics of capital flow within a nation.

The legislative framework governing foreign investment, known as the PMA (Penanaman Modal Asing/Foreign Investment), was instituted in Indonesia in 1967 with the overarching objective of consistently fortifying the nation's economic expansion, particularly over the long term and across tangible sectors. Foreign portfolio investment, denoting the transitory investment in securities, serves as a mechanism for the swift infusion of capital into governments and domestic enterprises. However, its inherently volatile nature also introduces economic risks. Analysing data from Bank Indonesia over the past decade reveals significant fluctuations in Indonesia's Foreign Direct Investment (FDI), reaching its zenith

in 2014 and plummeting to its nadir in 2016. This underscores the susceptibility of Indonesia's macroeconomic fundamentals to the global economic landscape. Similarly, Portfolio Investments in Indonesia have had similar fluctuations to FDI during the previous decade. Notably, in 2018, certain nations, including Turkey and Argentina, witnessed a substantial decline, primarily attributed to the economic crisis.

Given these dynamics, this research aims to provide a comprehensive understanding of the factors that contribute to economic growth in Indonesia, a prominent developing country in Southeast Asia. The study examines the relationship between various types of capital inflows, including foreign direct investment, portfolio investments and external financing, and their effects on Indonesia's economic growth. It offers insights into how these financial inputs can either promote or impede the nation's economic development. Understanding these interactions is crucial for formulating economic strategies that effectively optimise the use of capital inflows to achieve maximum growth. Furthermore, the analysis presented in this study is vital for Indonesia's economic policymakers, as it provides a foundation for crafting policies that leverage the benefits of foreign investments while also safeguarding domestic economic interests.

The research is motivated by the critical role that capital inflows play in the economic development of middle-income nations, particularly within the realm of international commerce. The transfer of funds from developed nations to developing economies such as Indonesia can substantially impact their financial systems by enhancing financial accessibility and reducing borrowing costs. Financial inflows of this nature can result in uneven growth in specific industries within the recipient nations, underscoring the significance of capital inflows for economic advancement and the enhancement of national welfare. Despite its potential and projected status as the fourth-largest economy by 2030, Indonesia is grappling with persistent trade deficits and economic hurdles, including high import levels and vulnerability to global economic crises (Handoyo et al., 2020). This situation highlights the necessity of investigating the intricacies of capital inflows into Indonesia and their effects on economic growth. An in-depth examination is essential to comprehend the nuances of FDI and portfolio investments in Indonesia, considering the current regulatory framework and changing investment trends. Nevertheless, there is a noticeable gap in research that thoroughly examines the various forms of capital inflows—such as foreign direct investment, portfolio investments, and external financing—and their specific impacts on Indonesia's economic growth. Furthermore, the correlation between these capital inflows and economic growth in Indonesia, specifically in terms of immediate effects and long-term trends, remains underexplored.

This research aims to fill this gap by employing the Vector Error Correction Model (VECM) to offer a nuanced understanding of how these financial inputs can foster or hinder Indonesia's economic development. Employing VECM enables a more intricate comprehension of the interaction between capital inflows and economic growth in Indonesia, encompassing both immediate effects and long-term patterns. Additionally, the study adds to the current literature on capital flows in developing countries, providing a good case study for comparison analysis with regional counterparts and affording broader insights into the management of economic vulnerabilities linked with capital movements. This work is advantageous not only for researchers and academicians but also as a pragmatic reference for policymakers in comparable economies aiming to comprehend the intricate relationship between foreign capital and economic expansion. The results of this study can guide the formulation of long-term strategic plans, facilitating the sustainable growth of the Indonesian economy and offering a replicable framework for other developing nations.

The research uses quarterly data spanning from 2004 to 2021, sourced from the World Bank Indicator and the Indonesian Central Bank (Bank Indonesia). The World Bank dataset comprises macroeconomic indicators such as real GDP and interest rates, while the Indonesian central bank provides investment data (Foreign Direct Investment and Portfolio Investment) and exchange rates. To enhance precision, the data in this study employs nominal rates or real values. The focus is solely on financial data, specifically capital inflow analysis, omitting considerations of trade balance conditions. The decision to use quarterly data is driven by the aim to augment the number of observations and obtain a comprehensive understanding of the short- and long-term impacts of capital flows on Indonesia, given the constraints posed by data availability.

Our results show that there is conclusive evidence of a positive effect of FDI on the country's economic growth. The initial period shows a negative response to FDI, but the subsequent lag period reveals a progressively increasing impact. However, the growth in Gross Domestic Product (GDP) is volatile, attributed to factors beyond FDI dependence. Additionally, the study emphasises that portfolio investments in Indonesia have a less substantial influence compared to FDI. The economy's volatility and susceptibility to rapid capital flight from portfolio investments are notable, given Indonesia's status as an emerging market.

Given its longer-term significance as a driver of economic development, these findings suggest that Indonesian policymakers should prioritise enhancing the nation's appeal to FDI. Furthermore, the relatively minor influence of portfolio

investments indicates a potential area for policy development. This could involve broadening the investment foundation and augmenting the appeal of opportunities for portfolio investments in Indonesia.

LITERATURE REVIEW

Capital flows, often known as capital inflows, can be categorised into two main components: Foreign Direct Investment (FDI) and Portfolio Investment (PI). Because developing countries heavily rely on these two factors, it is crucial to observe the impact of these variables on the economy of developing markets that significantly depend on the influx of capital.

Capital Inflow and Economic Growth

In emerging markets and developed countries, the capital inflow can stimulate economic conditions but, on the other hand, can also lead to the instability of other macroeconomic variables (Culha, 2006). In addition, Ferrucci et al. (2003) found that the flow of capital in developing countries (emerging markets) occurred in a particular cycle accompanied by a boom in lending, which is not infrequently accompanied by financial crises in the future. In the recent period, the increasing challenges for the economy in emerging market economies were also due to the need for supervision of recovery capital inflows to this region since the sudden stop at the end of 2008 and early 2009 (Ostry et al., 2010). As an illustration, the capital inflow could increase domestic Investment (Mileva, 2008), increase liquidity and reduce the cost of capital (Bekaert & Harvey, 2000), raise collateral benefits, and lead to increased economic growth (Ito, 1999). On the other hand, there is a shred of evidence that capital inflow was also followed by the obligations owed by the countries concerned in the future (Eichengreen & Luengnaruemitchai, 2008), as well as the threat of a surge (and/or capital reversal) that can harm the resistance (Prudential) and increase macroeconomic risk in a country (Ostry et al., 2010).

Recent research from Awad (2021) and Mohamed Sghaier (2022) shows that while foreign capital inflows have the potential to spur economic growth in African countries, the magnitude and sustainability of these benefits are heavily influenced by domestic factors. Both studies converge on the idea that the development of domestic institutions and human capital are crucial in ensuring that foreign capital inflows translate into tangible and lasting economic gains. Awad's emphasis on institutional strength and a conducive investment environment, combined with Sghaier's focus on human capital development, highlights a holistic approach to maximising the growth potential of foreign capital inflows in African economies.

Foreign Direct Investment and Economic Growth

To partially understand the connection between FDI and economic growth, we can look at research from Hossain et al. (2022). Using fixed effect methods, panel corrected standard errors (PCSE) and general methods of moments (GMM), they discovered that foreign direct investment and trade openness positively impacted the economic growth in 30 Asian countries. One of the most exciting findings of their research is that the financial crises that hit Asia in 1998 and 2009 had a negative impact on the region's economic growth, resulting in primarily sluggish economic growth. Furthermore, another research from (Mah, 2010) did not discover that FDI affected China's economic growth; the analysis indicated that the FDI inflows have not contributed to China's real economic growth but that the latter has caused the former. It indicates that the Chinese government would not be required to offer various tax or financial incentives to entice foreign companies. Even without FDI incentives, FDI inflows are anticipated to continue because of rapid economic expansion.

Using panel data approach recent studies by Ariyani and Firmansyah (2023), this study demonstrates that factors such as market size, corruption control and telecommunications infrastructure have a favourable and substantial impact on the inflow of FDI. Moreover, this research primarily focuses on the micro-level aspects of FDI.

This research shows that the impact of FDI varies by the macroeconomic stability of each country. The country with strong macroeconomic stability did not necessarily rely on foreign finance, whereas the country with a lack of macroeconomic stability tends to rely on foreign financing.

Portfolio Investment and Economic Growth

The research on portfolio investment shows that it is very volatile due to its nature as a short-run investment. According to Acha and Essien (2018), portfolio investment has a positive impact on economic growth in Nigeria. Another research from Duasa and Kassim (2009) indicates that economic development promotes changes in portfolio investment and volatility, not the other way around. This also demonstrates that the influence and relationship between portfolio investment and economic growth are not necessarily the same from nation to country but vary depending on the stability and conditions of the country.

Based on the previous research above, we can conclude that the impact of capital inflow is not always following the theoretical base but always depends on the economic stability of a country. As stated earlier, Indonesia is currently considered one of Asia's emerging markets, and it has the potential to develop into an advanced economy by the year 2045. Because of this, it is interesting to look at the economic performance of Indonesia to determine whether emerging market economies require the influx of capital to regain the economic growth that was promised or whether they do not.

In addition, Sugözü et al. (2023) examines the correlation between long-term investments in portfolios and economic growth, specifically analysing the attributes of assets and the level of development of the economy. Their analysis underscores the diversity in the influence of portfolio investments, emphasising that the consequences are not consistent across various types of assets and phases of economic development. According to Sugözü et al. (2023), the degree of development of a country has a substantial influence on the impact of portfolio investments on economic growth. In advanced economies, the financial markets tend to be more sophisticated and possess stronger regulatory structures, hence amplifying the favourable impacts of portfolio investments on economic growth. Nevertheless, in emerging economies, the absence of a strong financial infrastructure can occasionally result in susceptibility and volatility, thereby impeding economic expansion.

On the other hand, Shabbir et al. (2021) assess the impact of both domestic and foreign private investment on Pakistan's economic development. Their research reveals that foreign private investment, encompassing foreign portfolio investment, exerts a substantial and favourable influence on Pakistan's economic growth. The writers emphasise the significance of foreign capital in supplementing native resources, resulting in increased productive capacity and economic progress. Nevertheless, they also warn about the possible dangers linked to overseas investments, such as susceptibility to worldwide financial disturbances and potential outflow of money. They stress the importance of implementing robust macroeconomic policies and stringent regulatory frameworks to alleviate these risks.

By integrating these studies, it becomes evident that the correlation between portfolio investment and economic growth is intricate and diverse. The influence of portfolio investments on economic growth is contingent upon various elements, such as the attributes of the assets, the level of economic development and the robustness of the financial and regulatory frameworks in existence. Robust

procedures and policies are essential to effectively manage the risks associated with portfolio investments and promote sustainable economic development, especially in emerging and developing economies. These investments can greatly contribute to supplementing domestic resources and stimulating economic growth.

From the aforementioned research, it can be inferred that the influence of capital inflow does not consistently align with theoretical principles, but rather hinges on the economic stability of a nation. Indonesia is presently recognised as one of Asia's burgeoning markets and has the capacity to evolve into a sophisticated economy by 2045. Therefore, it is intriguing to examine Indonesia's economic performance in order to ascertain if developing market nations necessitate an infusion of capital to restore the promised economic development or not.

METHODOLOGY AND DATA

Comparison of VAR, ARDL and VECM

The methods that we consider in this article are Vector Autoregressive (VAR) models (Sims, 1980) and its derivation – Structural VAR (SVAR), Autoregressive Distributed Lag (ARDL) and Vector Error Correction Model (VECM). The choice of this model will depend on the result of the stationarity test. VAR models are widely used in time series research to examine the dynamic relationships between stationary time series variables that interact with one another. According to Stock and Watson (2001), compared to univariate autoregression which is a single-equation, single-variable linear model, "VAR is an n-equation, n-variable linear model in which each variable is in turn explained by its own lagged values, plus current and past values of the remaining n–1 variables." Through its unique design, VAR model offers a structured method for analysing the interdependencies among multiple variables without specifying causal relationships. In addition, it is also an important tool for forecasting and impulse response analysis that is used by most macroeconomic or policy-making institutions.

ARDL model, on the other hand, is used for analysing the relationship between stationary and non-stationary time series variables. It is suitable when variables in the model are a mix of I(0) (stationary) and I(1) (non-stationary) series. It captures both short-term and long-term dynamics in the data by regressing the dependent variable on its lagged values and lagged values of other variables.

VECM is a multivariate time series model employed for the analysis of cointegrated variables. It is an extension of the VAR model that incorporates both short-term dynamics and long-term equilibrium relationships through an

error correction term. It is especially beneficial when time series data are non-stationary yet exhibit a long-run equilibrium relationship. These characteristics of the VECM model make it a valuable tool for economic and financial time series analysis. According to Banerjee et al. (1993), VECM is an exceptionally valuable model for "Co-integration, Error Correction, and the Econometric Analysis of Non-Stationary Data" as it provides insight into both short-term volatility and long-term equilibrium correlations. They stress the importance of co-integration analysis and error correction techniques in understanding economic events and formulating credible forecasts.

The rationale behind employing this model lies in its capability to aid in the establishment and generation of meaningful interpretations regarding long-run and short-run relations through the Impulse Response Function (IRF). Additionally, we can perform forecasting analysis that could provide valuable insights that enable policymakers to anticipate future trends and formulate more effective policies regarding capital inflows (Andrei & Andrei, 2015).

Basic VAR

Generally, the VAR models are described as follows:

$$y_t = A_1 \cdot y_{t-1} + A_2 \cdot y_{t-2} + \cdots + A_p \cdot y_{t-p} + \beta \cdot x_t + \varepsilon_t \quad (1)$$

Where y_t is a vector k of endogenous variables, x_t is a vector d of exogenous variables, $A_1, \ldots, A_p$ and β are matrices of coefficients to be estimated, and ε_t are vectors of innovations that may have correlations with each other but are not correlated with their own lag and not correlate with all right-hand variables. Hence, the variables used in this research are GDP (Real Gross Domestic Product), PI (Portfolio Investment), FDI (Foreign Direct Investment), IR (Interest Rate) and ER (Exchange Rate).

From the main VAR equation, we construct simple models of each variable to show a correlation between their own lag; the result is presented as follows:

For Gross Domestic Product (GDP):

$$GDP_t = \alpha_{1,0} + \alpha_{1,1} GDP_{t-1} + \alpha_{1,2} FDI_{t-1} + \alpha_{1,3} PI_{t-1} + \alpha_{1,4} IR_{t-1} + \alpha_{1,5} ER_{t-1} + \in_{1,t} \quad (2)$$

For Foreign Direct Investment (FDI):

$$FDI_t = \alpha_{2,0} + \alpha_{2,1} GDP_{t-1} + \alpha_{2,2} FDI_{t-1} + \alpha_{2,3} PI_{t-1} + \alpha_{2,4} IR_{t-1} + \alpha_{2,5} ER_{t-1} + \in_{2,t} \quad (3)$$

For Portfolio Investment (PI):

$$PI_t = \alpha_{3,0} + \alpha_{3,1} GDP_{t-1} + \alpha_{3,2} FDI_{t-1} + \alpha_{3,3} PI_{t-1} + \alpha_{3,4} IR_{t-1} + \alpha_{3,5} ER_{t-1} + \in_{3,t} \quad (4)$$

For Interest Rate (IR):

$$IR_t = \alpha_{4,0} + \alpha_{4,1} GDP_{t-1} + \alpha_{4,2} FDI_{t-1} + \alpha_{4,3} PI_{t-1} + \alpha_{4,4} IR_{t-1} + \alpha_{4,5} ER_{t-1} + \in_{4,t} \quad (5)$$

For Interest Rate (ER):

$$ER_t = \alpha_{5,0} + \alpha_{5,1} GDP_{t-1} + \alpha_{5,2} FDI_{t-1} + \alpha_{5,3} PI_{t-1} + \alpha_{5,4} IR_{t-1} + \alpha_{5,5} ER_{t-1} + \in_{5,t} \quad (6)$$

Vector Error Correction Model

Following the unit-root and Johansen Cointegration Tests, we employ the VECM as the primary framework for this article. Specifically designed for the analysis of non-stationary time series data integrated of the same order [often denoted as I(1), signifying their attainment of stationarity after the first difference], the VECM proves instrumental in unraveling long-run and short-run relations through the IRF. In contrast, the VAR model finds suitability in the context of stationary data. Working with non-stationary data demands due consideration of integration and co-integration properties, crucial aspects often overlooked in a VAR model. Neglecting these considerations can yield misleading findings, primarily attributed to the presence of spurious correlations (Banerjee et al., 1993).

Furthermore, it is crucial to emphasise the significance of conducting the cointegration test, specifically employing the Johansen method in this particular case study. The purpose of a cointegration test is to detect the existence of a stable long-term relationship between non-stationary variables. Unlike VAR, VECM directly integrates these co-integration relationships into its structure by including the error correction term. This word refers to the phenomenon where variables rapidly converge towards the long-term equilibrium, which is of great importance in the analysis of economic and financial time series.

VECM incorporates an error correcting mechanism that accurately reflects the rate and direction of adjustment towards the long-term equilibrium. The usual VAR models do not provide this feature. When cointegration is detected by the Johansen test, the error correction term becomes crucial since

it indicates how deviations from the long-term trajectory are gradually rectified (Greene, 2018). Furthermore, there are several reasons why the ARDL model is not well-suited for our study. It is important to note that ARDL is capable of handling a combination of I(0) and I(1) variables. However, it does not directly capture cointegration relationships unless it is transformed into an Error Correction Model (ECM). The introduction of this transformation can complicate matters and potentially make it more difficult to directly analyse long-term relationships (Pesaran et al., 2001). In addition, it is worth noting that ARDL primarily emphasises short-term dynamics, which may not provide a comprehensive understanding of the long-term relationships that pique our interest (Nkoro & Uko, 2016). Additionally, our dataset covers a significant period from 2004 to 2021, providing us with 72 quarterly observations. While this may not appear extensive, it is actually quite sufficient for the VECM approach. The VECM analysis is known for its ability to handle cointegrated data, making it a suitable choice for our in-depth analysis (Johansen, 1991). In addition, VECM is highly skilled at tackling endogeneity concerns by including error correction terms that account for imbalances, making it a strong option for studying the evolving connection between capital inflows and economic growth (Engle & Granger, 1987).

Previous studies have effectively utilised VECM to analyse comparable datasets containing a combination of I(1) and I(0) variables. For example, Johansen (1991) used VECM to examine macroeconomic data and showed how it can effectively capture both short-term and long-term dynamics. Furthermore, research conducted by Odhiambo (2009) and Gurgul and Lach (2011) emphasises the practicality of utilising VECM to examine the cointegration relationships among economic variables. This supports the rationale for incorporating VECM in our research. Using VECM, a thorough analysis can be conducted to understand the complex relationships between foreign direct investment, portfolio investment and economic growth in Indonesia. This approach allows for a comprehensive examination of both short-term fluctuations and long-term trends, providing valuable insights.

According to the test result, which will be explained further in the next section, all the variables are stationary in the first differences, and there is one cointegration relationship among the variables. Therefore, we convert the Basic VAR models into the subsequent VECM specifications:

VECM specification for GDP:

$$\begin{aligned}\Delta GDP_t = \; & \alpha_1 ECT_{t-1} + \sum_{i=1}^{P} \gamma_{1i}\, \Delta GDP_{t-i} + \sum_{i=1}^{P} \delta_{1i}\, \Delta FDI_{t-i} + \\ & \sum_{i=1}^{P} \varsigma_{1i}\, \Delta PI_{t-i} + \sum_{i=1}^{P} \eta_{1i}\, \Delta IR_{t-i} + \sum_{i=1}^{P} \theta_{1i}\, \Delta ER_{t-i} + \epsilon_{1t}\end{aligned} \tag{7}$$

VECM specification for FDI:

$$\Delta FDI_t = \alpha_2 ECT_{t-1} + \sum_{i=1}^{P} \gamma_{2i}\, \Delta GDP_{t-i} + \sum_{i=1}^{P} \delta_{2i}\, \Delta FDI_{t-i} + \sum_{i=1}^{P} \varsigma_{2i}\, \Delta PI_{t-i} + \sum_{i=1}^{P} \eta_{2i}\, \Delta IR_{t-i} + \sum_{i=1}^{P} \theta_{2i}\, \Delta ER_{t-i} + \epsilon_{2t} \quad (8)$$

VECM specification for PI:

$$\Delta PI_t = \alpha_3 ECT_{t-1} + \sum_{i=1}^{P} \gamma_{3i}\, \Delta GDP_{t-i} + \sum_{i=1}^{P} \delta_{3i}\, \Delta FDI_{t-i} + \sum_{i=1}^{P} \varsigma_{3i}\, \Delta PI_{t-i} + \sum_{i=1}^{P} \eta_{3i}\, \Delta IR_{t-i} + \sum_{i=1}^{P} \theta_{3i}\, \Delta ER_{t-i} + \epsilon_{3t} \quad (9)$$

VECM specification for IR:

$$\Delta IR_t = \alpha_2 ECT_{t-1} + \sum_{i=1}^{P} \gamma_{4i}\, \Delta GDP_{t-i} + \sum_{i=1}^{P} \delta_{4i}\, \Delta FDI_{t-i} + \sum_{i=1}^{P} \delta_{4i}\, \Delta FDI_{t-i} + \sum_{i=1}^{P} \varsigma_{4i}\, \Delta PI_{t-i} + \sum_{i=1}^{P} \eta_{4i}\, \Delta IR_{t-i} + \sum_{i=1}^{P} \theta_{4i}\, \Delta ER_{t-i} + \epsilon_{4t} \quad (10)$$

VECM specification for ER:

$$\Delta FDI_t = \alpha_5 ECT_{t-1} + \sum_{i=1}^{P} \gamma_{5i}\, \Delta GDP_{t-i} + \sum_{i=1}^{P} \delta_{5i}\, \Delta FDI_{t-i} + \sum_{i=1}^{P} \varsigma_{5i}\, \Delta PI_{t-i} + \sum_{i=1}^{P} \eta_{5i}\, \Delta IR_{t-i} + \sum_{i=1}^{P} \theta_{5i}\, \Delta ER_{t-i} + \epsilon_{5t} \quad (11)$$

Where Δ denotes the first difference operator, ECT_{t-1} represents the error correction term from the cointegrating equation, capturing the long-term equilibrium relationship among the variables. α_i is the coefficient of the error correction term for each equation, showing how quickly variables adjust to restore equilibrium in the event of a deviation. γ, δ, ς, η and θ are the coefficients of the short-term dynamics of the model. And ϵ_{it} are the error terms.

In this model, the primary variable is the Real GDP (*GDP*), Foreign direct investment (*FDI*), and Portfolio Investment (*PI*), whereas interest rate (*IR*) and the exchange rate (*ER*) will have a role as the control variable. The control variables in this research have a role in improving the intern al validity by reducing the overall impact of confounding factors and other extraneous variables. This helps to eliminate any potential bias in the research as well as adds to the establishment of a correlational or causal relationship between the variables of interest (Nielsen & Raswant, 2018).

Testing and Identifying Assumptions

Based on the growing literature in this field (Greene, 2018) notes that we must follow two procedures to test the assumptions of autoregressive models before running the models. First, the data must be stationary; if they are, VAR models will be used; if some variables are stationery and others are not, and we can prove that there is at least one cointegration relationship (using a cointegration test), then we can use VECM models to confirm that there is a long- and short-run relationship between the variables. Moreover, if the data is not stationary and there is no cointegration relationship, structural VAR (SVAR) models can be used. The second step is to assess how much lag should be incorporated into the models. The test of the hypotheses will specifically describe the following:

Stationarity test

Wooldridge (2020) explains why the stationarity test is vital in macroeconomics and time series analysis. The stationarity test aims to determine whether statistical features such as mean, and covariance vary over time. In other words, stationarity in Time Series refers to the absence of Trend and Seasonal components.

The stationarity test in this study uses the Augmented Dickey-Fuller (ADF) method because it permits the analysis of autocorrelated data and includes lag values based on the frequency of the data, both of which are crucial for the parametric autoregressive analysis. Furthermore, the ADF test can eliminate the unpredictable result caused by unit roots in the time series analysis. The ADF test is written as follows:

$$\Delta y_t = y_t - y_{t-1} = \alpha + \beta t + \gamma y_{t-1} + e_t \tag{12}$$

Where γ_t is the data of the research. The equations are formulated to permit linear regression of $\Delta\gamma_t$ against t and γ_{t-1} then it can test whether $\gamma = 0$ or not, and then we can have a random walk process; if there is no random walk process and $-1 < 1 + \gamma < 1$, then we can have stationary data.

Furthermore, to enhance the robustness of our analysis on stationarity, we performed supplementary unit root tests, such as the Phillips-Perron (PP), DF-GLS and KPSS tests. These tests enhance the ADF test and offer a more thorough evaluation of the characteristics of our variables. The PP test is a useful tool since it takes into consideration any potential serial correlation and heteroskedasticity in the error terms (Phillips & Perron, 1988). The DF-GLS test improves the effectiveness of the unit root test by employing a detrending process known as generalised least squares (GLS) (Elliott et al., 1996).

The KPSS test, however, examines the presence of stationarity by testing for a unit root as an alternative, offering a distinct viewpoint on the characteristics of the data (Kwiatkowski et al., 1992). These further tests serve to validate the integration characteristics of the variables, particularly for GDP, FDI and PI, and address the concerns highlighted about the alteration in the stationarity status of GDP.

Cointegration test

Based on the theory it is explained that we cannot rely solely on the pure unit root test due to a lack of empirical and theoretical evidence (Hjalmarsson & Österholm, 2007). This prompted econometricians to believe that near-integrated processes, which explicitly allow for a small (unknown) deviation from the pure unit-root assumption, are a better way to describe time series analysis.

This research uses the Johansen Cointegration Test to examine cointegrating correlations between numerous nonstationary time series data in order to assert the model's near-integration process. Unlike other cointegration tests, such as the Engle-Granger Test, the Johansen test permits the existence of several cointegrating relationships. The presence of cointegration shows that the series is in a state of long-term equilibrium.

Lag length criteria

In the time series models such as Autoregressive and Error Correction models, the lag length criterion is an essential part of the analysis for inferential and interpretive purposes and requires the selection of the most appropriate number of differenced, lagged terms in the model (Sharp, 2010). This research uses the Akaike Information Criterion (AIC) as the primary approach to determining the lag of the Vector Error Correction models in this research based on the fact that AIC is better for the small sample size (Liew, 2006), which occurs in the data set in this research. The basic AIC specification is constructed as follows:

$$AIC_p = -2T\left[\ln\left(\hat{\sigma}_p^2\right)\right] + 2p \tag{13}$$

Where p is the number of parameters and $\left[\ln\left(\hat{\sigma}_p^2\right)\right]$ are log-likelihood as a model fit metric. The greater the number, the more optimal the fit. Typically, this is derived from statistical output.

Data

The data used in this research are Quarterly Data from 2004 to 2021. This data is sourced from World Bank Indicator and the Indonesian Central Bank (Bank Indonesia). The dataset from World Bank indicators is macroeconomic data (GDP Riil and Interest Rate); from the Indonesian central bank, the data used are investment data (FDI and PI) and exchange rate data.

All the data in this paper use nominal rate or the actual value, so we can capture the real condition more precisely. In addition, we also only focused on the financial data because this paper aims to explain only the capital inflow analysis and not focus on the trade balance condition. Moreover, due to the lack of data, we used quarterly data to increase the number of observations and get the best picture of the capital flow's short- and long-term impact on Indonesia.

Impulse Response Function

Impulse Response Function (IRF) is an additional crucial notion in vector autoregressive analysis. The IRFs are used to monitor the reaction of system parameters to impulses of system shocks (Ronayne, 2011) . The IRFs framework according to Lütkepohl (2010) describe as follows:

$$y_t = A(L)^{-1}\mu_t = \mu_t + \sum_{i=1}^{\infty}\Phi_i u_{t-i} \tag{14}$$

Impulse response analysis in this approach may be based on the counterfactual experiment of tracing the marginal effect of a shock to one variable through the system by setting one component to zero μ_t's to one and zero for all other components and analysing the responses of the γ_t's to this inclination as time passes These are merely the constituent parts of the Φ_i matrices. Because the μ_t's are the system's one-step ahead forecast mistakes, the resulting functions are sometimes known as forecast error impulse responses.

RESULT

Unit Root Test

This article employs the ADF test to conduct unit root tests at both levels and first differences. The results are presented in Table 1.

Table 1
Unit Root Test – ADF

Variable	ADF (level)	ADF (1st diff.)	PP (level)	PP (1st diff)	DF-GLS (level)	DF-GLS (1st diff)	KPSS (level)	KPSS (1st diff)
GDP	0.9566	0.0000	0.9592	0.0000	–2.408	–7.254	0.195	0.0863
FDI	0.0018	0.0000	0.0000	0.0000	1.758	–5.551	0.162	0.0318
PI	0.0000	0.0000	0.0000	0.0000	–2.555	–5.37	0.153	0.0564
ER	0.833	0.0000	0.7891	0.0000	–4.517	–9.134	0.252	0.0769
IR	0.3808	0.0000	0.4469	0.0000	–5.26	–8.512	0.145	0.0571

Notes: GDP = Gross Domestic Product; FDI = Foreign Direct Investment; PI = Portfolio Investment; ER = Exchange Rate; IR = Interest Rate. (Source: authors' computations).

The stationarity test results indicate that only two variables, Foreign Direct Investment (FDI) and Portfolio Investment (PI), are stationary at their levels. For the remaining variables—Gross Domestic Product (GDP), Exchange Rate (NT), and Interest Rate (IR)—the null hypothesis of a unit root cannot be rejected at the level, implying non-stationarity. However, upon taking the first differences, all variables become stationary.

Based on these findings, we consider either a Structural Vector Autoregressive (SVAR), Autoregressive Distributed Lag (ARDL) or a Vector Error Correction Model (VECM) for our study. To determine the right model, we conduct the Johansen Cointegration Test to check the possibility of the cointegration relationships within the model. Depending on the outcomes of the Johansen Cointegration Test, we can determine which model to proceed with.

Cointegration Test

The unit root test results indicate that FDI and PI are stationary at the level, while other variables such as the GDP, ER and IR are not. We then proceed to the Johansen Cointegration Test to determine whether a long-run equilibrium relationship exists among the variables. Cointegration tests are crucial in time series analysis to verify whether non-stationary series move together over time, indicating a stable long-term relationship. This allows us to appropriately model both the short-term dynamics and long-term equilibrium in our analysis using the VECM.

The Johansen Cointegration Test uses maximum likelihood estimation to identify the number of cointegrating vectors in a VAR model. Detecting these relationships helps avoid spurious regression results and provides a robust framework for analysing the dynamic interactions between variables. The results are shown in Table 2.

Table 2
Johansen Cointegration Test

Johansen test for cointegration					
Trend: Constant			Number of obs. = 70		
Sample: 2004q3 through 2021q4			Number of lags = 2		
Maximum rank	Params	LL	Eigenvalue	Trace statistics	Critical value 5%
0	30	–2857.8672	-	79.8965	68.52
1	39	–2841.4003	0.37530	46.9627*	47.21
2	46	–2826.0767	0.35455	16.3157	29.68
3	51	–2821.8148	0.11465	7.7918	15.41
4	54	–2817.952	0.10449	0.0662	3.76
5	55	–2817.9189	0.00095		

Note: * is significant at the 5% level. (Source: Author's computation).

From the test results, we can conclude that at the 95% significance level, there is a cointegration relationship between variables with one cointegrating equation. Thus, this allows for the use VECM Model at the level to capture both short-term and long-term dynamics in the data.

Lag Length Criteria

To perform this test, we used AIC (Akaike Information Criterion) to estimate the precise lag length, and the result is shown in Table 3.

Table 3
AIC (Lag Length Criteria Result)

Lag-order selection criteria Sample: 2005q1 through 2021q4 Number of obs = 68								
Lag	LL	LR	df	*p*	FPE	AIC	HQIC	SBIC
0					5.0e + 32	92.3231	92.4007	92.519
1	–2827.94	610.1	36	0.000	1.8e + 29*	84.41*	84.9531*	85.7808*
2	–2805.19	45.507	36	0.133	2.80E + 29	84.7996	85.8083	87.3455
3	–2780.93	48.512	36	0.080	4.20E + 29	85.145	86.6193	88.8659
4	–2726.26	109.33*	36	0.000	2.70E + 29	84.596	86.5359	89.4919

Notes: *optimal lag. Endogenous: GR, ER, FDI, PI, IR, GDP; Exogenous: _cons. (Source: Author's computation).

Based on the test above, the maximum lag proposed is 1, with the smallest AIC 84.41*.

VECM Estimation

The Error Correction Term (ECT) in the Vector Error Correction Model (VECM) is crucial for understanding the speed at which deviations from the long-term equilibrium are corrected. Reporting only the ECT provides insights into the speed and direction of adjustment back to equilibrium following a shock. The significance and sign of the ECT help identify the presence and strength of the long-term relationship between the variables.

Table 4
VECM estimation result

Variable	ΔGDP	ΔFDI	ΔPI	ΔIR	ΔER
ECT (–1)					
Coefficient	–0.0175*	0.000825***	0.002097***	–1.09e-07	–0.0000228
Std. Error	0.009185	0.000188	0.000323	1.11e-07	0.000039
z	–1.90	4.39	6.50	–0.98	–0.58
P > z	0.057	0.000	0.000	0.326	0.561
[95% conf. interval]	[–0.0355, 0.0005]	[0.0005, 0.0012]	[0.0015, 0.0027]	[–3.27e-07, 1.09e-07]	[–0.0000996, 0.000054]
Constant	902.4597	2634.23***	6488.122***	–0.398077	8.362016
Std. Error	31531.82	645.773	1107.403	0.382063	134.558
Z	0.03	4.08	5.86	–1.04	0.06
P > z	0.977	0.000	0.000	0.297	0.950
[95% conf. interval]	[–60898.77, 62703.69]	[1368.537, 3899.922]	[4317.652, 8658.592]	[–1.146907, 0.350753]	[–255.3664, 272.0905]

Notes: ECT (–1) represents the lagged error correction term, indicating the speed of adjustment back to long-term equilibrium. Standard errors are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively (Source: author's computations).

The estimated coefficient for GDP is –0.0175, which is statistically significant at the 10% level. Table 4 explain that the estimated coefficient for GDP is –0.0175, which is statistically significant at the 10% level. This suggests that there is a sluggish process of returning to equilibrium. The presence of a negative and substantial coefficient indicates that when the GDP strays from its long-term balance, it progressively adjusts itself back to that equilibrium. The estimated coefficient for FDI is 0.000825, which is highly statistically significant ($p < 0.001$), suggesting a quick adjustment. The positive sign of the ECT for FDI may appear paradoxical, but it actually indicates a pattern where temporary deviations in FDI are promptly adjusted to align with the long-term trajectory. Similarly, the estimated coefficient of time (ECT) for PI is 0.002097, which is similarly highly statistically significant ($p < 0.001$). This indicates that any errors in PI are corrected quickly. The positive sign in this context might be attributed to the dynamic structure of the model, wherein short-term adjustments contribute to

the restoration of equilibrium. The ECTs for the IR and ER variables are not statistically significant, suggesting that these variables do not demonstrate robust long-term corrective dynamics in this model configuration.

The constant terms in the equations for the short-term give modifications that establish a baseline. As an illustration, the constant term for FDI is 2634.23, which is highly significant. This suggests that there are considerable and substantial short-term effects on FDI. Similarly, the value of the constant PI is 6488.122, which signifies significant short-term impacts. The short-term coefficients represent the immediate connections between the variables, emphasising the dynamic interconnections within the system.

In addition, the VECM results have important economic implications for policy-making and strategic planning in Indonesia. The gradual convergence of GDP towards equilibrium indicates that economic expansion responds with a delay to disturbances, underscoring the necessity for short-term stabilisation policies that also foster long-term growth. The swift adaptation of FDI and PI underscores the volatility and sensitivity of these capital inflows, indicating that efforts to attract and maintain foreign investments should be given priority. More precisely, the favourable effect of FDI suggests that foreign investments rapidly rectify themselves, indicating a dynamic investment climate. This implies that initiatives aimed at boosting investor confidence might result in long-term economic advantages. Similarly, the swift adjustment in PI highlights the significance of upholding a stable and appealing portfolio investment environment, which can mitigate the impact of temporary economic volatility.

The lack of statistical significance in the estimated coefficients for IR and ER indicates that these variables do not have a substantial impact on the long-term adjustment processes over the analysed period. It is possible that other factors, such as regulatory frameworks and macroeconomic stability, may have a greater impact on these variables. To achieve balanced and sustainable economic growth, policymakers should prioritise the creation of a stable economic climate that facilitates both foreign direct investments and portfolio investments.

Furthermore, these results also allow us to facilitate a deep comprehension of the dynamic connections between capital inflows and economic growth in Indonesia. This strategy provides a clear explanation of the significance of the ECT. It presents a comprehensive collection of outcomes, enabling a thorough examination of both long-term and short-term patterns. Johansen (1991) states that the VECM is specifically tailored to address cointegrated systems by incorporating an error correction mechanism that captures both short-term dynamics and long-term equilibrium relationships. The utilisation of this strategy

is crucial in comprehending the intricate interconnections among variables within an economic framework (Elliott et al., 1996; Kwiatkowski et al., 1992; Phillips & Perron, 1988).

DISCUSSION

FDI and PI as instruments of capital inflows play a crucial role in preserving a nation's trade balance and sustaining economic stability, as is well recognised. Since 2012, Indonesia has experienced difficulties since its trade balance has remained negative. To provide a more comprehensive explanation of the trade balance issue from a capital inflow perspective, this study employs IRF analysis and forecasts capital inflow circumstances in Indonesia over the next few years. The outcome is displayed in Figure 1.

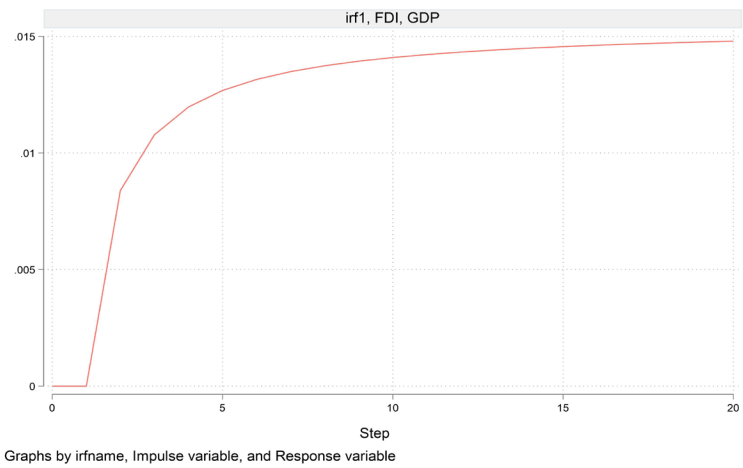

Figure 1: Shock of FDI on GDP (Source: author's computation)

According to the graph, a one standard deviation shock in FDI will cause fluctuations in economic growth as measured by GDP. From the graph, we can predict that FDI will be at a negative or zero level throughout the early period before increasing over time. Due to the nature of FDI as a long-term investment in the form of goods and services that will provide a return on investment over time, this condition emerged. However, there is a probability that FDI will face a slight decline prior to the 10-year timeframe. The existence of this condition is predicated on the premise that, in the context of the Indonesian economy, the enormous economic expansion is driven by dynamically changing consumption

that has a large impact on economic growth. If FDI is managed effectively over the long run, exports of goods and services will increase, which will have a direct impact on Indonesia's balance of payments and economic growth. This result is congruent with the findings by Kalirajan et al. (2009). Explain how FDI affects the growth of several other nations, such as India and Malaysia, and how this effect is caused by changes in macroeconomic variables over the long term.

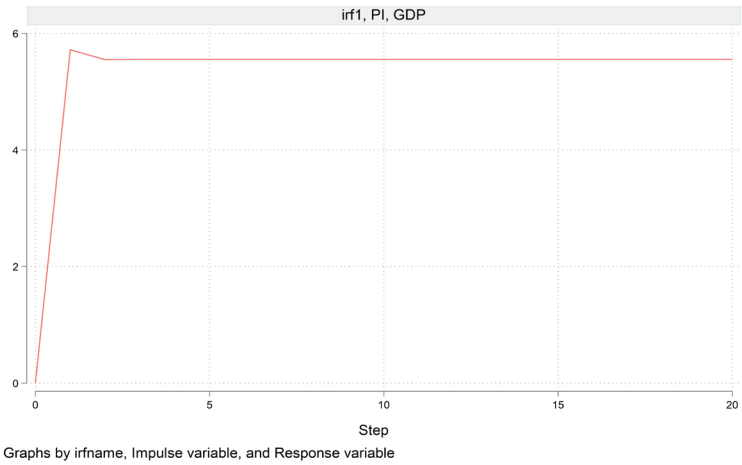

Figure 2: Shock of PI on GDP (Source: Author's Computation)

In contrast, Figure 2 shows the reaction to economic growth in the event of a shock is a rise of one standard deviation in the initial portfolio investment variable. This is due to the extremely liquid and volatile character of portfolio investments on the stock market, which creates conditions conducive to investment development and economic expansion. When portfolio growth increases in value, capital will flow in, and the exchange rate will appreciate. When the Rupiah appreciates, domestic goods become significantly more expensive; as a result, exports decrease and imports increase. This process results in a long-term decline in GDP, hence slowing down Economic Growth. This is demonstrated by the second-period impulse reaction, but the rise in the portfolio remains the principal driver of the Investment component of GDP, and in the end, both GDP and economic growth will rise. When there is a shock to portfolio investments entering the capital market, the relatively small size of Indonesia's capital market compared to that of wealthy nations does not produce growth instability. As evidenced by the impulsive response, it has a positive impact but does not contribute to economic growth in industrialised nations like Indonesia. Despite this, portfolio investment remains an important variable in explaining Indonesia's economic growth fluctuations.

Forecasting Analysis

This research creates forecasting analyses for the three key variables in this study using the same equation; the first is the GDP, as indicated in Figure 3.

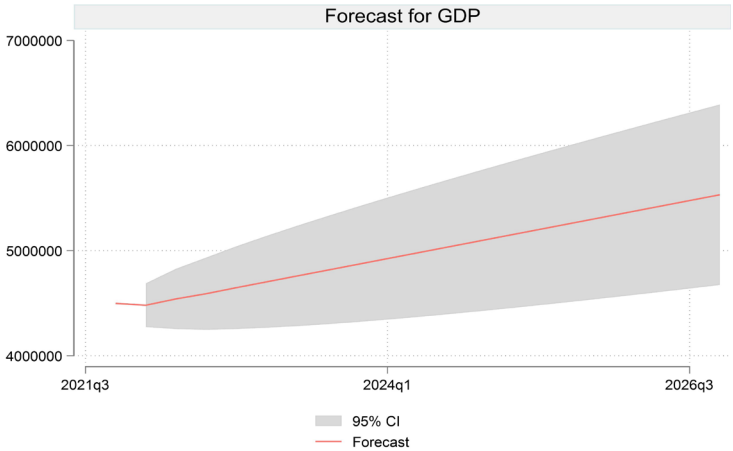

Figure 3: GDP forecast (Source: author's computation)

Figure 3 indicates that Indonesia's long-term economic growth, as measured by GDP, is anticipated to improve through 2025. However, due to the pandemic situation, the GDP is predicted to decline somewhat at the start of 2021. It is believed that the government's progressive policies addressing infrastructure development, tax reform, and human resource development will have a positive effect on economic growth.

In addition, when direct investment/foreign direct investment is included, the results of the estimates indicate a time of large growth at the beginning of the term, followed by a very stable but chaotic development. According to some foreign institutions, the improvement in Indonesia's investment rating does provide sufficient confidence for investors at the beginning of the year. Nevertheless, the trade balance remains fragile due to the weak exchange rate and low investment rate, this has had a lasting effect (over 10 years). Therefore, FDI will only experience stable development as shown in Table 4.

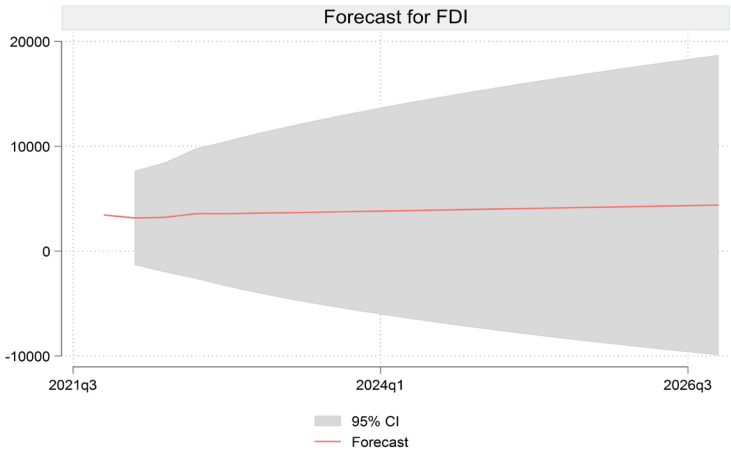

Figure 4: FDI forecast (Source: author's Computation)

As depicted in Figure 5, the PI variable does not experience a major increase and tends to remain constant despite experiencing small fluctuations due to its volatile nature and short-term impact.

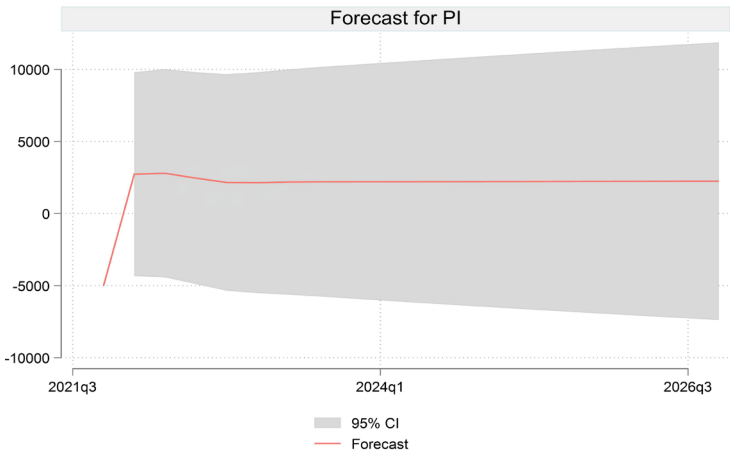

Figure 5: PI forecast (Source: author's computation)

In the coming years, this volatility is predicted to be greatly influenced by external variables, including the currency rate movement relative to the weak U.S. dollar. As a result, the looming international economic shock continues to have a significant impact on the local economy.

Previously, we believed that the underpinnings of the Indonesian economy were fragile and that the shock to FDI would have a direct impact on its economic growth. On the other hand, the surge in FDI has little impact on the Indonesian economy, mostly due to the low ICOR (Incremental Capital Output-Ratio) score, which can be read as investment inefficiency. Mohapatra and Gopalaswamy (2016) found that instead of focusing just on FDI inflow growth, it is essential to evaluate FDI outflow as well. Rather than being controlled or rectified, macroeconomic policy should aim to attract and retain FDI during a crisis. This research will aid the government in establishing a suitable strategy to attract FDI and mitigate the risk of economic shock to prevent capital outflow.

CONCLUSION AND LIMITATIONS

Conclusion and Policy Implications

The main objective of this study is to investigate the impact of Capital Inflow on Indonesia's economic growth. The analysis yields conclusive evidence indicating a positive effect of FDI on Indonesia's economic growth. While the initial period exhibits a negative response to FDI, the subsequent lag period displays a progressively increasing impact, as revealed by the study. Nevertheless, the growth in GDP is characterised by volatility, attributed to the fact that the GDP/ growth variable is not singularly reliant on FDI; other factors also contribute to its fluctuations. Moreover, the study also highlights that the influence of portfolio investments in Indonesia is less substantial than FDI. Given Indonesia's status as an emerging market, its economy remains highly volatile and susceptible to rapid capital flight from portfolio investments.

These findings indicate that Indonesian authorities should prioritise efforts to improve the country's appeal to FDI, since it has been shown to have a greater impact on long-term economic growth. Enhancing the business climate, guaranteeing political and economic steadiness, and providing incentives for international investors may be part of the process. In addition, the first unfavourable reaction to FDI underscores the necessity for implementing measures to alleviate any immediate detrimental consequences. This can be achieved by enhancing domestic industries and labour markets, enabling them to effectively assimilate and capitalise on foreign investments. The relatively limited effect of portfolio investments indicates a possible area for policy advancement, with the goal of broadening the range of investment sources and increasing the appeal of portfolio investment prospects in Indonesia. Implementing certain policy measures will

not only maximise the advantages of FDI for long-term economic expansion but also strive towards a more stable and diverse economic framework that utilises different types of capital inflows.

Limitations

There are various constraints associated with this research. Prior to doing the forecast analysis, it is necessary to update the dataset used in these studies in order to obtain more recent information on the long-term impact of capital influx. Furthermore, this study was constrained to investigating the enduring correlation and is unable to comprehensively capture transient circumstances.

Future Research

To mitigate selection bias in future research, augmenting the dataset and conducting an analysis that accurately portrays the enduring and immediate impacts of capital inflow on all emerging market economies, not only in specific countries, is advisable.

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