Economics Development Analysis Journal Vol. 13 (3) (2024)

Economics Development Analysis Journal

http://journal.unnes.ac.id/sju/index.php/edaj

The Influence of Macroeconomic on Investment Performance

Muhammad Firmansyah[1]✉, [2]Immanuel Mu'ammal, [3]Arini Roro Anggun Tsalasa

[1,2]Faculty of Economics and Business, University of Muhammadiyah Malang

[3]Faculty of Agriculture, Muhammadiyah University, Gresik

Article Information

History of Article
Received April 2024
Accepted June 2024
Pusblished August 2024

Keywords:
Inflation, Portfolio Investment, Money Supply, Exchange Rate, Stock Price

Abstract

Shocks caused by macroeconomic variables and monetary transmission have impacted investment portfolios in the five ASEAN countries, both in the short and long term. This research aims to evaluate each country's proficiency in managing macroeconomic variables in relation to portfolio investments. Additionally, it seeks to explore the influence of these macroeconomic variables on portfolio investment and the time required for their effects to manifest in both short-term and long-term contexts. This study is quantitative in nature and uses secondary data. The data were sourced from the central banks of the ASEAN-5 countries and from investing.com for stock price index information. The results indicate that interest rates, exchange rates, and stock price indexes significantly affect portfolio investment in the short term. In contrast, in the long term, inflation, exchange rates, and money supply were found to have a significant impact on portfolio investment. Based on these findings, it is recommended that ASEAN-5 governments focus on exchange rates and economic openness, as these factors influence portfolio investment in the region and can attract investors' interest.

✉ Corresponding author:
Address: firmansyah92@umm.ac.id
E-mail: Faculty of Economics and Business, University of Muhammadiyah Malang

ISSN 2252-6560

INTRODUCTION

Every country aspires to create a conducive economic environment characterized by stability and the absence of economic turmoil. Such an atmosphere fosters a favourable business climate, enabling the achievement of national goals such as improving societal welfare. Infrastructure is a key driver of economic growth in any country (Rinika et al., 2021). An increase in GDP often prompts the government to prioritize infrastructure development with the aim of attracting investors (Kyriacou et al., 2019; Xu et al., 2021). The establishment of a favourable business environment, supported by comprehensive and adequate infrastructure, is essential in drawing more investors to Indonesia (Fuddin et al., 2023). However, limited government funding to provide sufficient capital remains a significant obstacle to economic development in Indonesia. As a result, foreign capital, plays a critical role in enhancing capital market liquidity and serving as a source of funding for domestic development. Portfolio investment is one of the most important indicators of a well-functioning and investor-friendly equity market. In addition to profitability, factors such as easy access to portfolio information, financial stability, and low tax rates significantly contribute to liquidity flows (Hakeem et al., 2017).

In recent years, the interest of the Indonesian population in portfolio investment has grown considerably. Several factors influence investment decisions in a country's portfolio market. These factors can be categorized into two groups: internal factors, which include monetary and fiscal policies, macroeconomic conditions, and the financial market situation, and global factors, which involve substitutable portfolio assets from other countries (Li, 2017; Ogundipe et al., 2019). According to Hassan Khayat (2020), portfolio investment is a highly volatile form of capital flow. During periods of national or global crises, portfolio investments become so unstable that investors tend to sell their holdings to mitigate risk. On the other hand, in times of stability, investor interest in portfolio investments increases, particularly in middle-income countries.

Investment decisions in the portfolio market through monetary policy indicators are designed to maintain economic stability, making them more effective than policies driven by trends or popular opinion. These policies remain relevant even when the financial system is resilient enough to withstand crises (Laureys et al., 2020). One of the most adjustable variables in portfolio investment is domestic monetary policy. To achieve monetary policy objectives, industrial countries frequently use interest rates to stabilize economic activity (Alfarina et al., 2020). Monetary policy decisions, such as lowering interest rates and reducing borrowing costs, enhance the appeal of investing in companies. Investors are able to make informed decisions about their investments because monetary policy plays a crucial role in regulating portfolio investment flows (Orji et al., 2022). Changes in monetary variables directly impact the level of investment in a country. Effective investments significantly contributes to both the growth and stability of economic.

The capital market is a complex, computerized financial system where price movements serve as a crucial reference for predictions by both individuals and institutions. The movement of share prices can be simply explained through the theory of supply and demand—when many people purchase shares, the price increases, and when they sell, the price decreases. However, from a broader perspective, the dynamics of shares on the stock exchange are far more intricate. Overall stock movements are reflected in the stock price index, which is influenced not only by supply and demand but also by internal factors related to company performance and external factors, such as the rupiah exchange rate, global gold prices, the volume of incoming portfolio investment, and stock indices from other countries.

Research by Suhendra et al. (2016) demonstrates that interest and exchange rates negatively impact portfolio investment. Similarly, Cenedese et al. (2016), found no correlation between the exchange rate and equity

returns, suggesting that a depreciating exchange rate leads to a decline in portfolio investment in Indonesia. In contrast, research by Hidayat et al. (2018) shows that the money supply has no significant effect on stock returns for the LQ 45 index listed on the Indonesia Stock Exchange (BEI). Additionally, Njogo et al. (2018), found that inflation has a significant negative impact on stock market returns in Nigeria.

Shocks induced by macroeconomic variables and monetary transmission impacted investment portfolios in five ASEAN countries under both short-term and long-term conditions. In the short term, investment portfolios are sensitive to fluctuations in interest rates, exchange rates, and the composite stock price index. However, they do not exhibit sensitivity to shocks stemming from inflation and money supply during this period. In contrast, in the long term, investment portfolios respond to shocks caused by inflation, exchange rates, and money supply, while remaining unaffected by interest rate fluctuations and money supply shocks.

This research is different from previous research. From several studies that have been described, the research objective is to measure the ability of each country to handle macroeconomic variables on portfolio investment and then determine how macroeconomic variables affect portfolio investment and how long the time lag is needed to respond to these changes.

RESEARCH METHODS

This study utilizes a quantitative research design, relying on secondary data that was processed and analyzed. The data were sourced from the central banks of the ASEAN-5 countries and investing.com for the collection of stock price index data. The research sample comprises the ASEAN-5 countries: Indonesia, Malaysia, Singapore, the Philippines, and Thailand. Portfolio investment (Y) serves as the dependent variable in this study, while the independent variables (X) include the exchange rate, stock price index, interest rates, inflation, and money supply. The Vector Error Correction Model (VECM) was employed as the analytical tool to examine the relationships between variables in both the short and long term. VECM analysis effectively identifies relationships and shocks between variables over various time horizons. The model is expressed as follows:

$$\mathrm{PI} = \mathrm{C}_1 + + \mathrm{a}_{1\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{ER}_{\mathrm{t}-\mathrm{k}} + + \mathrm{a}_{1\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{SPI}_{\mathrm{t}-\mathrm{k}} + + \mathrm{a}_{1\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{IR}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{1\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} INF_{t-k} + \mathrm{a}_{1\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{MS}_{\mathrm{t}-\mathrm{k}} + \in_1 \quad \ldots\ldots\ldots\ldots (1)$$

$$\mathrm{ER} = \mathrm{C}_1 + \mathrm{a}_{2\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{PI}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{2\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{SPI}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{2\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{IR}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{2\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} INF_{t-k} + \mathrm{a}_{2\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{MS}_{\mathrm{t}-\mathrm{k}} + \in_2 \quad \ldots\ldots\ldots\ldots (2)$$

$$\mathrm{SPI} = \mathrm{C}_1 + \mathrm{a}_{3\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{PI}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{3\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{ER}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{3\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{IR}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{3\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} INF_{t-k} + \mathrm{a}_{3\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{MS}_{\mathrm{t}-\mathrm{k}} + \in_3 \quad \ldots\ldots\ldots\ldots (3)$$

$$\mathrm{IR} = \mathrm{C}_1 + \mathrm{a}_{4\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{PI}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{4\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{ER}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{4\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{SPI}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{4\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} INF_{t-k} + \mathrm{a}_{4\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{MS}_{\mathrm{t}-\mathrm{k}} + \in_4 \quad \ldots\ldots\ldots\ldots (4)$$

$$\mathrm{INF} = \mathrm{C}_1 + \mathrm{a}_{5\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{PI}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{5\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{ER}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{5\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{SPI}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{5\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} IR_{t-k} + \mathrm{a}_{5\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{MS}_{\mathrm{t}-\mathrm{k}} + \in_5 \quad \ldots\ldots\ldots\ldots (5)$$

$$\mathrm{MS} = \mathrm{C}_1 + \mathrm{a}_{6\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{PI}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{6\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{ER}_{\mathrm{t}-\mathrm{k}} + + \mathrm{a}_{6\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{SPI}_{\mathrm{t}-\mathrm{k}} + \mathrm{a}_{6\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} IR_{t-k} + \mathrm{a}_{6\mathrm{i}} \sum_{\mathrm{i}=1}^{\mathrm{k}} \mathrm{INF}_{\mathrm{t}-\mathrm{k}} + \in_6 \quad \ldots\ldots\ldots\ldots (6)$$

Several additional tests were conducted prior to obtaining the final results, including tests for stationarity, cointegration, causality, and the impulse response function (Maulayati et al., 2020). This research utilized panel data, which combines both time series and cross-sectional data. Typically, time series data encounter issues related to non-stationary (stochastic) trends.

RESULTS AND DISCUSSION

In the Augmented Dickey-Fuller (ADF) test, a 5% significance level was applied. The unit root test in this study was conducted at both the level and the first difference. At the level specification, several variables were found to be non-stationary and did not pass the unit root test. Consequently, it was necessary to perform the test at the first difference to ensure that each variable achieved stationarity and passed the unit root test.

Table 1. ADF Test (Augmented Dickey-Fuller)

Variables	Critical Value	Levels		1st Different	
		ADF Stats	Prob	ADF Stats	Prob
PI	5%	22.5629	0.0125	33.5807	0.0002
INF	5%	11.7093	0.3050	20.5097	0.0248
IR	5%	29.2129	0.0012	38.0568	0.0000
E.R	5%	18.9960	0.0403	22.7832	0.0116
CI	5%	15.1833	0.1255	36.3624	0.0001
M2	5%	6.54854	0.7673	50.0676	0.0000

Source: Data Processed, 2024

Determining the optimal lag in VECM estimation is necessary before carrying out VECM testing. The importance of selecting the optimal lag is an important thing to handle autocorrelation that occurs in the VECM system. The optimal lag length was determined using the information criteria contained in the test. The lag used referred to a lag that has the criteria of Likelihood Ratio (LR), Final Prediction (FPE), Akaike Information Critic (AIC), Schwarz Information Criterion (SC), and Hannan – Quin Crition (HQ).

Table 2. Determination of Lag Length

Lag	LogL	L.R	FPE	AIC	S.C	HQ
0	-334.7795	NA	11.54146	19.47312	19.73975*	19.56516
1	-279.3619	88.66823	3.931668	18.36354	20.22995	19.00782
2	-218.2437	76.83422	1.132877	16.92821	20.39442	18.12475
3	-157.6705	55.38126*	0.487167*	15.52403*	20.59002	17.27281*

Source: Data Processed, 2024

The table above shows that the third lag is the lag with the best length. This happens because most of the Likelihood Ratio (LR), Final Prediction (FPE), Akaike Information Criterion (AIC), and Hannan – Quin Crition (HQ) criteria are found in lag order 3. Meanwhile, the Schwarz Information Criterion (SC) is at lag 1. Carrying out data stability tests on the variables to be studied functions when the data has been declared stable. The results of the analysis of Variance Decomposition (VD) and Impulse Response Functional (IRF) applied to the VECM estimation will automatically be able to show predictions from the variables being analyzed. A system in VECM can be said to be stable if all the roots have a modulus number of less than one. The table below shows the results of stability.

Table 3. Roots of Characteristic Polynomials

Root	Modulus
-0.957296	0.957296
0.948535 - 0.075568i	0.942773
0.948535 + 0.075568i	0.942773
-0.105892 + 0.924403i	0.930448
-0.105892 - 0.924403i	0.930448
-0.311370 - 0.790957i	0.850038
-0.311370 + 0.790957i	0.850038
0.119725 - 0.820558i	0.829246
0.119725 + 0.820558i	0.829246
0.814112	0.814112
-0.803203 - 0.103210i	0.809807
-0.803203 + 0.103210i	0.809807
0.707349	0.707349
-0.328345 - 0.442461i	0.550983
-0.328345 + 0.442461i	0.550983

Root	Modulus
0.271563	0.271563
0.081949 + 0.052107i	0.097112
0.081949 - 0.052107i	0.097112

Source: Data Processed, 2024

From the results of the data stability test that has been carried out, the modulus figure obtained is less than 1 (< 1). The variables used in this study showed a stable condition. Besides the modulus value, stability tests are also usually carried out using other methods, which can be seen in the image below. In this figure, if all the blue points are located inside the circle, it can be said that the variable used is stable. From the results of this test, it is known that the data used in the VECM model estimation is declared stable so that it can be used for short-term or long-term analysis in the form of VECM analysis.

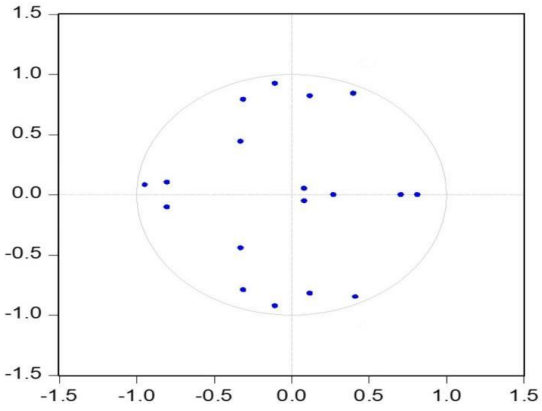

Figure 1. Inverse Roots AR Characteristic Polynomial

Source: Data Processed, 2024

The cointegration test in the research conducted here has the aim of detecting whether from the group of variables that are indicated to be non-stationary at that level the conditions for the integration process are fulfilled, where the variables have an equivalent degree of first-level differentiation. The results presented in the table below are integration tests by applying a cointegration test derived from the Johansen Trace Statistics test.

This test aims to determine whether there is a long-term influence on the variables researched. VECM can be continued if cointegration occurs. But if it is unstable, then VECM cannot be continued. According to the results of the Johansen Trace Statistics test below, it was found that the variables in this study show long-term integration. This can be seen by the trace statistic value > the critical value of 5%. Thus, in the long-term condition, these variables will influence one another. This can be shown by the presence of an asterisk. After going through the stages and stationary data at the first level of differentiation and the existence of co-integrity, it can be stated that the Vector Error Correction Model (VECM) is the final estimation model that is suitable for use or implementation.

Then, the Granger Causality test was used to observe whether the two variables have a two-way correlation. It can be said, that a variable whether it has a significant cause-and-effect correlation with other variables because each variable studied has the opportunity as a variable that provided influence to other variables. The VAR Pairwise Granger Causality test and a significance level of five percent were used as bivariate causality tests in this study. The following table shows the results of the Bivariate Granger Causality test.

Table 4. Cointegration Test Johansen Trace Statistics Test

No. of CE(s)	Eigenvalues	Statistics	Critical Value	Prob.**
None *	0.894469	215.1135	95.75366	0.0000
At most 1*	0.815311	136.4073	69.81889	0.0000
At most 2*	0.615587	77.28936	47.85613	0.0000
At most 3*	0.589076	43.82807	29.79707	0.0007
At most 4	0.167846	12.70093	15.49471	0.1262
At most 5*	0.164016	6.270091	3.841466	0.0123

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

No. of CE(s)	Eigenvalues	Statistics	Critical Value	Prob.**
None *	0.894469	78.70616	40.07757	0.0000
At most 1*	0.815311	59.11793	33.87687	0.0000
At most 2*	0.615587	33.46129	27.58434	0.0078
At most 3*	0.589076	31.12713	21.13162	0.0014
At most 4	0.167846	6.430841	14.26460	0.5586
At most 5*	0.164016	6.270091	3.841466	0.0123

Source: Data Processed, 2024

Table 5. Granger Causality Test

Null Hypothesis:	Obs	F-Statistics	Prob.
INF does not Granger Cause PI	40	0.71141	0.5521
PI does not Granger Cause INF		0.13694	0.9373
IR does not Granger Cause PI	40	0.88842	0.4573
PI does not Granger Cause IR		0.80672	0.4992
ER does not Granger Cause PI	40	0.56121	0.6444
PI does not Granger Cause ER		2.85394	0.0521
CI does not Granger Cause PI	40	0.14726	0.9307
PI does not Granger Cause CI		1.66509	0.1935
M2 does not Granger Cause PI	40	0.30810	0.8193
PI does not Granger Cause M2		0.93899	0.4329
IR does not Granger Cause INF	40	4.44307	**0.0099**
INF does not Granger Cause IR		7.16259	**0.0008**
ER does not Granger Cause INF	40	0.26703	0.8487
INF does not Granger Cause ER		0.89531	0.4539
CI does not Granger Cause INF	40	2.71965	0.0602
INF does not Granger Cause CI		1.73825	0.1783
M2 does not Granger Cause INF	40	1.83234	0.1605
INF does not Granger Cause M2		1.01959	0.3965
ER does not Granger Cause IR	40	1.74313	0.1773
IR does not Granger Cause ER		0.96945	0.4188
CI does not Granger Cause IR	40	4.47206	**0.0097**
IR does not Granger Cause CI		1.25951	0.3042
M2 does not Granger Cause IR	40	1.53414	0.2240
IR does not Granger Cause M2		2.88911	0.0501
CI does not Granger Cause ER	40	1.29091	0.2938
ER does not Granger Cause CI		0.51711	0.6734
M2 does not Granger Cause ER	40	1.34383	0.2770
ER does not Granger Cause M2		0.60172	0.6185
M2 does not Granger Cause CI	40	0.94493	0.4301
CI does not Granger Cause M2		5.97211	**0.0023**

Source: Data Processed, 2024

From the table above, it can be explained that the inflation variable does not have a significant influence on the investment portfolio and vice versa. This can be seen because the prob values obtained are 0,5521 and 0,9373. The interest rate variable does not show a significant influence on the investment portfolio. This also happens where the prob values obtained are 0,4573 and 0,4992. Then, the exchange rate variable does not show a significant influence on the investment portfolio and vice versa, as evidenced by the prob values obtained which are

0,6444 and 0,0521. In the composite stock price index variable, there is also no two-way relationship with the investment portfolio variable, which is proven by the prob values of 0,9307 and 0,1935.

The results of the VECM estimation will display the short-term and long-term relationship between investment portfolio variables, inflation, interest rates, exchange rates, composite stock price index, and money supply. In this form of estimation, the investment portfolio is the dependent variable. Then, the inflation, interest rates, exchange rates, composite stock price index, and money supply are the independent variables. The results of the VECM estimation, which is intended to analyze the short-term and long-term, influence of the independent variable on the dependent variable are shown in the following table.

Table 6. Correlation between Monetary Variables and Portfolio Investment in the Short-Term

Error Correction:	**D(PI,2)**	**D(INF,2)**	**D(IR,2)**	**D(ER,2)**	**D(CI,2)**	**D(M2,2)**
CointEq1	-0.406949	-1.15E-05	-9.54E-06	-1.91E-06	1.80E-06	1.63E-07
	(0.15347)	(1.8E-05)	(6.8E-06)	(4.3E-07)	(8.0E-07)	(3.0E-07)
	[-2.65161]	[-0.65186]	[-1.40540]	**[-4.42321]**	**[2.24432]**	[0.54450]
D(PI(-1),2)	-0.660616	-1.43E-05	1.36E-05	1.93E-06	-3.44E-06	-2.17E-07
	(0.23717)	(2.7E-05)	(1.0E-05)	(6.7E-07)	(1.2E-06)	(4.6E-07)
	[-2.78542]	[-0.52331]	[1.29533]	**[2.89033]**	**[-2.78235]**	[-0.46751]
D(PI(-2),2)	0.753887	-5.53E-06	-2.84E-06	3.78E-07	-1.15E-06	1.41E-08
	(0.25437)	(2.9E-05)	(1.1E-05)	(7.1E-07)	(1.3E-06)	(5.0E-07)
	[2.96368]	[-0.18871]	[-0.25217]	[0.52927]	[-0.86718]	[0.02835]
D(INF(-1),2)	4407.914	-0.619664	0.313706	0.032913	-0.011338	0.000922
	(2539.69)	(0.29281)	(0.11237)	(0.00713)	(0.01324)	(0.00496)
	[1.73561]	**[-2.11628]**	**[2.79172]**	**[4.61304]**	[-0.85620]	[0.18598]
D(INF(-2),2)	-462.0748	-0.086920	0.356537	0.019181	-0.017109	0.004392
	(1934.17)	(0.22300)	(0.08558)	(0.00543)	(0.01008)	(0.00378)
	[-0.23890]	[-0.38978]	**[4.16620]**	**[3.53009]**	[-1.69655]	[1.16295]
D(IR(-1),2)	-7746.065	-0.708650	-0.467783	-0.022445	-0.021087	-0.005119
	(4063.45)	(0.46849)	(0.17979)	(0.01142)	(0.02119)	(0.00793)
	[-1.90628]	[-1.51263]	**[-2.60182]**	[-1.96617]	[-0.99529]	[-0.64521]
D(IR(-2),2)	8572.995	-1.069604	-0.868477	-0.006721	-0.020419	-0.003250
	(4141.64)	(0.47750)	(0.18325)	(0.01164)	(0.02159)	(0.00809)
	[2.06995]	**[-2.24000]**	**[-4.73931]**	[-0.57769]	[-0.94557]	[-0.40188]
D(ER(-1),2)	308957.8	18.26720	4.187362	0.250119	0.083847	-0.268859
	(73563.1)	(8.48132)	(3.25485)	(0.20666)	(0.38355)	(0.14364)
	[4.19990]	**[2.15382]**	[1.28650]	[1.21029]	[0.21861]	[-1.87173]
D(ER(-2),2)	115857.3	24.29719	4.900729	-0.081424	0.517505	-0.110977
	(55799.8)	(6.43333)	(2.46890)	(0.15676)	(0.29094)	(0.10896)
	[2.07630]	**[3.77677]**	[1.98499]	[-0.51942]	[1.77876]	[-1.01855]
D(CI(-1),2)	93010.48	6.838729	1.696527	0.121486	-0.731210	-0.146640
	(38081.0)	(4.39048)	(1.68492)	(0.10698)	(0.19855)	(0.07436)
	[2.44244]	[1.55763]	[1.00689]	[1.13559]	**[-3.68272]**	[-1.97206]
D(CI(-2),2)	72486.32	5.952541	0.553008	0.100962	-0.189710	-0.124156
	(35851.7)	(4.13345)	(1.58628)	(0.10072)	(0.18693)	(0.07001)
	[2.02184]	[1.44009]	[0.34862]	[1.00243]	[-1.01488]	[-1.77353]
D(M2(-1),2)	-49068.67	2.376579	-0.022826	-0.525645	1.578073	-0.607397
	(104970.)	(12.1024)	(4.64449)	(0.29489)	(0.54731)	(0.20497)
	[-0.46745]	[0.19637]	[-0.00491]	[-1.78250]	**[2.88334]**	**[-2.96336]**

Error Correction:	D(PI,2)	D(INF,2)	D(IR,2)	D(ER,2)	D(CI,2)	D(M2,2)
D(M2(-2),2)	32719.01	-8.955622	-2.174112	-0.011345	0.224102	-0.195046
	(81323.4)	(9.37602)	(3.59821)	(0.22846)	(0.42401)	(0.15879)
	[0.40233]	[-0.95516]	[-0.60422]	[-0.04966]	[0.52853]	[-1.22829]

Source: Data Processed, 2024

In the short term, changes in the investment portfolio in lags one and two have a significant influence on the current investment portfolio. Then, the interest rate has an influence on the investment portfolio at lag two. The exchange rate also has an influence on the investment portfolio at lags one and two. Besides, the composite stock price index also has an influence on the investment portfolio at lags one and two. Meanwhile, inflation has no influence on investment portfolios, this is also the case with money supply (M2), which also has no influence on investment portfolios in the short term.

Short-term shocks to inflation are primarily influenced by inflation itself at a two-period lag. Additionally, inflation is impacted by interest rates at a two-period lag and by the exchange rate at both one- and two-period lags. Conversely, portfolio investment, the composite stock price index, and money supply (M2) do not exert any significant influence on inflation at either the one- or two-period lag. Shocks in inflation at lags one and two have short-term effects on interest rates, which are also affected by shocks in interest rates at the same lags. Other variables, however, show no significant short-term effects on interest rates. The exchange rate in the short term is influenced by shocks from portfolio investment at a one-period lag, as well as by inflation shocks at one- and two-period lags. Shocks from portfolio investment at a one-period lag also affect the composite stock price index, which, in turn, experiences its own shock at a one-period lag. Furthermore, money supply (M2) contributes to shocks at a one-period lag, exerting a short-term influence on the composite stock price index. The money supply, however, is only impacted by its own shock at a one-period lag, indicating short-term effects.

In the long term, inflation provides shocks that affect investment (Singh et al., 2019). Shocks caused by exchange rates also have an impact on investment (Ogundipe et al., 2019), and money supply (M2) has an impact on investment portfolios (Mamvura et al., 2020; Thi et al., 2023). Meanwhile, interest rates and the composite stock price index do not have a long-term influence on investment portfolios.

Table 6. Correlation between Monetary Variables and Portfolio Investment in the Long-Term

Cointegrating Eq :	D(INF(-1))	D(IR(-1))	D(ER(-1))	D(CI(-1))	D(M2(-1))
D(PI(-1))	**[4.79334]**	[-1.60497]	**[11.5808]**	[0.88195]	**[-5.57262]**

Source: Data Processed, 2024

According to the results of the impulse response function (IRF) in the image below, there is a fluctuating or up-and-down movement in the second to tenth periods of the investment portfolio. Inflation movements began to show fluctuations starting in the fourth period and until the tenth period. In interest rates, fluctuating movements began at the beginning of the period. However, in the seventh period, the fluctuations began to increase. The exchange rate tends to show stable movements from the beginning of the first period to the tenth period. The Composite Stock Price Index fluctuated quite low until the sixth period, but the fluctuation increased in the seventh to tenth periods. Money supply (M2) shows a stable movement tendency from the beginning of the first period to the tenth period.

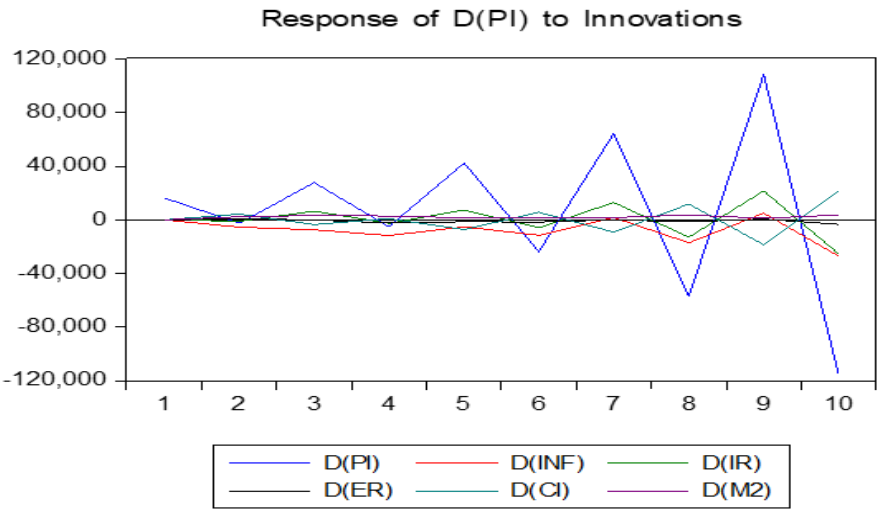

Figure 2. Portfolio Impulse Response Function to Monetary Variables
Source: Data Processed, 2024

Variations of decomposition in this research are used as a form of observing the ability of macroeconomic variables and monetary variables to influence investment portfolios in ASEAN, especially Indonesia, Malaysia, Singapore, Philippines, and Thailand. The table below shows that inflation, interest rates, exchange rates, the composite stock price index, and money supply (M2) have an intensity in their influence on investment portfolios in each period. Where in the first period, the investment portfolio was still influenced by the investment portfolio itself. Meanwhile, other variables had not yet had an influence. Then, after entering the second to tenth periods, these variables have had an influence on the investment portfolio in ASEAN.

Table 7. Portfolio Variance Decomposition to Monetary Variables

Period	S.E	D(PI)	D(INF)	D(IR)	D(ER)	D(CI)	D(M2)
1	16159.83	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	17966.76	82.93404	9.748265	0.372959	0.152035	5.357054	1.435647
3	34746.18	85.48953	7.213221	3.476132	0.040685	2.511045	1.269388
4	37310.81	76.05639	16.04757	3.520265	0.437623	2.243624	1.694518
5	57555.42	85.78136	7.583690	3.040391	0.242796	2.569602	0.782165
6	63880.65	83.49182	9.378431	3.329537	0.264881	2.839535	0.695792
7	91961.78	89.00079	4.555965	3.565124	0.128248	2.385155	0.364721
8	111053.0	87.47072	5.517889	3.802896	0.106258	2.752270	0.349966
9	157671.0	90.46045	2.838582	3.728752	0.053367	2.740275	0.178573
10	199738.5	89.42472	3.612793	3.921540	0.062895	2.833580	0.144467

Source: Data Processed, 2024

There is a two-way causal relationship between macroeconomic and monetary variables in their influence on investment portfolios in ASEAN. This two-way causal relationship is found in the inflation variable and the interest rate variable. This information supports that interest rates are a variable that is able to control and maintain the movement of inflation efficiently in a country. Moreover, assumptions based on contemporary economic theory state that increasing interest rates will result in reduced aggregate demand in the economy so that inflation can be reduced (Egilsson, 2022; Mirza et al., 2018; Nawab et al., 2021).

In the long term, investment portfolios are influenced by variables such as inflation, exchange rates, and the money supply (M2), which have significant impacts when implemented. Changes in inflation rates exert a lasting influence on investment portfolios. There is a strong relationship between inflation and interest rates; the interest rate, or profit sharing, combined with the inflationary conditions in a country at the time of portfolio maturity, serves as a key determinant of the profits or losses realized by portfolio managers. Therefore, it is crucial for the investment portfolio to remain insulated from current inflation trends. The profits and investment amounts at maturity are determined by inflation rates and future profit sharing at the time of payment, as higher or lower inflation levels inevitably influence investment decisions Lian et al., 2019).

The exchange rate is the only variable in this research that exerts both short-term and long-term influences on the investment portfolio. The close relationship between exchange rates and investment portfolios is undeniable. An appreciation in the domestic currency's value often occurs alongside an increase in portfolio investment, and this increase in portfolio investment can, in turn, be driven by currency appreciation. Such dynamics are vital for investment planning, particularly in optimizing returns and balancing portfolios (Gabaix et al., 2015; Tsen, 2017).

The money supply (M2) within a country's economy has a long-term influence on its investment portfolio. The stability of the money supply is a crucial factor in attracting and increasing portfolio investments (Waqas et al., 2015). An expansion of the money supply encourages the capitalization of companies listed in the domestic market, which in turn fosters confidence among international investors (Kartal et al., 2022; Mohamed Ibrahim Mugableh, 2015; Thwaini et al., 2017). Moreover, an increase in the investment portfolio tends to elevate the money supply to higher levels (Ayomi et al., 2021; David et al., 2021).

CONCLUSION

The research results indicate that monetary policy positively impacts portfolio investment in Indonesia, Malaysia, Singapore, the Philippines, and Thailand in the long term. This implies that central banks can adjust policy interest rates to stimulate portfolio investment in these countries. Effective coordination between central banks, focusing on the monetary sector, and governments, concentrating on the real sector, is crucial for enhancing the transmission of monetary policy. The study's findings also serve as a reference for identifying macroeconomic factors that positively or negatively affect portfolio investment performance.

However, the research is limited in scope, focusing solely on each country’s proficiency in managing macroeconomic variables related to portfolio investment. Further studies should analyze the role of policy coordination and capital market deepening in accelerating monetary policy transmission. This study suggests that the ASEAN-5 governments must pay close attention to exchange rates and economic openness, as both significantly influence portfolio investment and can attract investor interest. Expansionary monetary policies may help address unemployment and boost purchasing power during economic downturns. Additionally, an increase in the money supply can promote societal prosperity, which in turn stimulates savings, investment, and overall economic growth.

REFERENCES

Alfarina, N., & Aimon, H. (2020). Intervensi Kebijakan Moneter Terhadap Investasi Portofolio: Kasus Indonesia dan Amerika Serikat. *Jurnal Kajian Ekonomi Dan Pembangunan*, *2*(1), 1. https://doi.org/10.24036/jkep.v2i1.8793

Anggitawati, D., & Ekaputra, I. A. (2020). Foreign Portfolio Investment Flows and Exchange Rate: Evidence in Indonesia. *Emerging Markets Finance and Trade*, *56*(2), 260–274. https://doi.org/10.1080/1540496X.2018.1496419

Aryento, J., Kusnadi, F., & Lesmono, D. (2022). Calculation of Credited Interest Rate With Investment Year Method and Portfolio Method. *BAREKENG: Jurnal Ilmu Matematika Dan*

Terapan, *16*(3), 787–796. https://doi.org/10.30598/barekengvol16iss3pp787-796

Ayomi, S., Sofilda, E., Hamzah, M. Z., & Ginting, A. M. (2021). The impact of monetary policy and bank competition on banking industry risk: A default analysis. *Banks and Bank Systems*, *16*(1), 205–215. https://doi.org/10.21511/bbs.16(1).2021.18

Bruno, V. G., Shim, I., & Shin, H. S. (2022). Dollar Beta and Stock Returns. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4005264

Camanho, N., Hau, H., & Rey, Hh. (2018). Global Portfolio Rebalancing and Exchange Rates. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3112543

Cenedese, G., Payne, R., Sarno, L., & Valente, G. (2016). What Do Stock Markets Tell Us about Exchange Rates? *Review of Finance*, *20*(3), 1045–1080. https://doi.org/10.1093/rof/rfv032

Conrad, C. (2021). The effects of money supply and interest rates on stock prices, evidence from two behavioral experiments. *Applied Economics and Finance*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3791211%0Ahttps://www.researchgate.net/profile/Christian-Conrad-3/publication/349519541_The_Effects_of_Money_Supply_and_Interest_Rates_on_Stock_Prices_Evidence_from_Two_Behavioral_Experiments/links/6034a

David, D., & Widjaja, I. (2021). Pengaruh Inflasi, GDP, Kurs, dan Foreign Portfolio terhadap IHSG. *Jurnal Manajemen Bisnis Dan Kewirausahaan*, *5*(5), 482. https://doi.org/10.24912/jmbk.v5i5.13289

Edo, S., & Kanwanye, H. (2022). Capital returns and currency value: The contrasting key drivers of foreign portfolio investments in Sub-Saharan African economies. *IIMB Management Review*, *34*(2), 178–188. https://doi.org/10.1016/j.iimb.2022.06.001

Egilsson, J. H. (2022). How Raising Interest Rates Can Cause Inflation and Currency Depreciation. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4189577

Fuddin, M. K., & Anindyntha, F. A. (2023). The Effect of Monetary Variable Shocks on Indonesian Portfolio Investment. *Signifikan: Jurnal Ilmu Ekonomi*, *12*(2), 307–326. https://doi.org/10.15408/sjie.v12i2.31525

Gabaix, X., & Maggiori, M. (2015). International liquidity and exchange rate dynamics. *Quarterly Journal of Economics*, *130*(3), 1369–1420. https://doi.org/10.1093/qje/qjv016

Haider Khan, M. A., Saddique, S., & Hashmi, S. H., M. A. (2017). The Impact of Stock Market Performance on Foreign Portfolio Investment in China. *International Journal of Economics and Financial Issues*, *7*(2), 460–468.

Hakeem, M. M., & Suzuki, K.-I. (2017). Foreign portfolio investment and economy: The network perspective. *ArXiv*.

Hassan Khayat, S. (2020). Determinants of International Foreign Portfolio Investment Flows to GCC Countries: An Empirical Evidence. *International Journal of Business and Management*, *15*(10), 51. https://doi.org/10.5539/ijbm.v15n10p51

Hidayat, L. R., Setyadi, D., & Azis, M. (2018). Pengaruh Inflasi dan Suku Bunga dan Nilai Tukar Rupiah serta Jumlah Uang Beredar terhadap Return Saham. *Forum Ekonomi*, *19*(2), 148. https://doi.org/10.29264/jfor.v19i2.2121

Hirota, S. (2023). Money supply, opinion dispersion, and stock prices. *Journal of Economic Behavior and Organization*, *212*, 1286–1310. https://doi.org/10.1016/j.jebo.2023.06.014

Huang, W., Mollick, A. V., & Nguyen, K. H. (2016). U.S. stock markets and the role of real interest rates. *Quarterly Review of Economics and Finance*, *59*, 231–242. https://doi.org/10.1016/j.qref.2015.07.006

Kartal, M. T., Ertuğrul, H. M., & Ulussever, T. (2022). The impacts of foreign portfolio flows and monetary policy responses on stock markets by considering COVID-19 pandemic: Evidence from Turkey. *Borsa Istanbul Review*, *22*(1), 12–19. https://doi.org/10.1016/j.bir.2021.06.003

Kurdiansyah, Wisandani, I., & Nasrulloh, A. A. (2021). Pengaruh Pdb Dan Kurs Rupiah-Usd Terhadap Investasi Portofolio Asing Di Indonesia. *Ekspansi: Jurnal Ekonomi, Keuangan, Perbankan, Dan Akuntansi*, *13*(2), 170–178. https://doi.org/10.35313/ekspansi.v13i2.3456

Kyriacou, A. P., Muinelo-Gallo, L., & Roca-Sagalés, O. (2019). The efficiency of transport infrastructure investment and the role of government quality: An empirical analysis. *Transport Policy*, *74*, 93–102. https://doi.org/10.1016/j.tranpol.2018.11.017

Laureys, L., Meeks, R., & Wanengkirtyo, B. (2020). Optimal Simple Objectives for Monetary Policy when Banks Matter. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3736974

Li, S. (2017). A Study on the Relationship between Monetary Policy Variables and Stock Market. *International Journal of Business and Management*, *13*(1), 218. https://doi.org/10.5539/ijbm.v13n1p218

Lian, C., Ma, Y., & Wang, C. (2019). Low interest rates and risk-taking: Evidence from individual investment decisions. *Review of Financial Studies*, *32*(6), 2107–2148. https://doi.org/10.1093/rfs/hhy111

Mamvura, K., & Sibanda, M. (2020). Modelling short-run and long-run predictors of foreign portfolio investment volatility in low-income Southern African Development Community countries. *Journal of Economic and Financial Sciences*, *13*(1). https://doi.org/10.4102/jef.v13i1.559

Maulayati, R. R., Bahril, M. A., & Herianingrum, S. (2020). Effect of Macroeconomic Variables on Third-Party Funds in Islamic Commercial Banks in Indonesia. *Journal of Islamic Economics Lariba*, *6*(1), 19–40. https://doi.org/10.20885/jielariba

.vol6.iss1.art2

McMillan, D. G. (2022). The Time-Varying Relation between Stock Returns and Monetary Variables. *Journal of Risk and Financial Management*, *15*(1). https://doi.org/10.3390/jrfm15010009

Mirza, A., & Rashidi, M. (2018). Causal Relationship between Interest Rate and Inflation Rate: A study of SAARC Economies. *Kardan Journal of Economics and Manangement Sciences*. https://doi.org/10.31841/kjems.2021.80

Mohamed Ibrahim Mugableh. (2015). Time Series Analysis of Inward Foreign Direct Investment Function in Malaysia. *Procedia - Social and Behavioral Sciences*, *172*. https://ac.els-cdn.com/S1877042815004565/1-s2.0-S1877042815004565-main.pdf?_tid=51b2059c-cf47-11e7-85a2-00000aacb35d&acdnat=1511329267_359d5166063d84cab6426aa36c35fd2c

Nawab, N., Ahmad, S., & Khan, M. T. (2021). Causal Relationship between Inflation Rate, Exchange Rate, Interest Rate and Stock Market Returns. *University of Wah Journal of Management Sciences*, *5*(1), 58–68.

Njogo, B. O., Inim, V. E., Ohiaeri, N. V, & Ogboi, C. (2018). The Relationship Between Stock Returns And Inflation Rates In Nigeria From 1995 To 2014. *International Journal of Economics, Commerce and Management United Kingdom*, *VI*(2). http://ijecm.co.uk/

Ogundipe, A. A., Alabi, J., Asaleye, A. J., & Ogundipe, O. M. (2019). Exchange rate volatility and foreign portfolio investment in Nigeria. *Investment Management and Financial Innovations*, *16*(3), 241–250. https://doi.org/10.21511/imfi.16(3).2019.22

Orji, A., Ekeocha, D. O., Ogbuabor, J. E., & Anthony-Orji, O. I. (2022). Monetary policy channels, sectoral outputs and sustainable growth in the ECOWAS region: a rigorous analysis and implications for policy. *EconomiA*, *23*(1), 105–122. https://doi.org/10.1108/econ-06-2022-0048

Oyerinde, A. A. (2019). Foreign Portfolio Investment And Stock Market Development in Nigeria. *The Journal of Developing Areas*, *53*(3). https://doi.org/10.1353/jda.2019.0034

Rinika, D., Winardy, J., Engelina, J., & Clarence, A. (2021). Analysis of the Effect of Increasing the GDP of Central Java Province Through Infrastructure Development. *Eduvest - Journal of Universal Studies*, *1*(6), 409–415. https://doi.org/10.59188/eduvest.v1i6.79

Sgammini, M., & Muzindutsi, P. F. (2020). Effect of Exchange Rate Movements on the Performance of Investment Portfolios in South Africa. *International Journal of Economics and Finance Studies*, *12*(2), 469–486. https://doi.org/10.34109/ijefs.202012214

Shabbir, M. S., & Muhammad, I. (2019). The dynamic impact of foreign portfolio investment on stock prices in Pakistan. *Transnational Corporations Review*, *11*(2), 166–178. https://doi.org/10.1080/19186444.2019.1616508

Singh, N. P., & Joshi, N. (2019). Investigating Gold Investment as an Inflationary Hedge. *Business Perspectives and Research*, *7*(1), 30–41. https://doi.org/10.1177/2278533718800178

Suhendra, I., & Istikomah, N. (2016). Faktor Penentu Investasi Portofolio Di Indonesia. *Jurnal Riset Akuntansi Terpadu*, *9*(2). https://doi.org/10.35448/jrat.v9i2.4314

Thi, N., & Chi, D. (2023). Impact of money supply and macroeconomic indicators on foreign portfolio investment: Evidence from Vietnam. *Banks and Bank Systems*, *18*(4), 94–104. https://doi.org/10.21511/bbs.18(4).2023.09

Thwaini, F. H., & Hamdan, A. A. (2017). Money supply. Endogenous or exogenous variable? With reference to Iraq. *Banks and Bank Systems*, *12*(4), 144–153. https://doi.org/10.21511/bbs.12(4-1).2017.03

Tsai, Y.-S., Chang, C.-P., & Tzang, S.-W. (2023). *The Relationship Between Money Supply and Stock Return, Before and After Quantitative Easing Policy*. 63–79. https://doi.org/10.2991/978-94-6463-076-3_5

Tsen, W. H. (2017). Real exchange rate returns and real stock price returns. *International Review of Economics and Finance*, *40*, 340–352.

Tursoy, T. (2019). The interaction between stock prices and interest rates in Turkey: empirical evidence from ARDL bounds test cointegration. *Financial Innovation*, *5*(1). https://doi.org/10.1186/s40854-019-0124-6

Vukovic, D. B., Maiti, M., & Frömmel, M. (2022). Inflation and portfolio selection. *Finance Research Letters*, *50*. https://doi.org/10.1016/j.frl.2022.103202

Waqas, Y., Hashmi, S. H., & Nazir, M. I. (2015). Macroeconomic factors and foreign portfolio investment volatility: A case of South Asian countries. *Future Business Journal*, *1*(1–2), 65–74. https://doi.org/10.1016/j.fbj.2015.11.002

Wuhan, Suyuan, L., & Khurshid, A. (2015). The effect of interest rate on investment; empirical evidence of Jiangsu Province, China. *Journal of International Studies*, *8*(1), 81–90. https://doi.org/10.14254/2071-8330.2015/8-1/7

Xu, X., Dou, G., & Yu, Y. (2021). Government investment strategy and platform pricing decisions with the cross-market network externality. *Kybernetes*, *50*(3), 711–736. https://doi.org/10.1108/K-10-2019-0714