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Analysis of the Impact of Macroeconomic Variable Volatility on Equity Mutual Fund Net Asset Value in Indonesia

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A B S T R A C T
This research investigates the effect of interest rate volatility, exchange rate volatility, and competitor stock price volatility on the performance of equity mutual funds in Indonesia. Monthly data from January 2013 to December 2023 were analyzed using ARCH–GARCH models to measure volatility and the ARDL approach to assess relationships. The results reveal that interest rate and competitor stock price volatility significantly reduce NAV, while exchange rate volatility show no immediate effect, suggesting a delayed adjustment. These findings contribute to understanding how macroeconomic and market factors influence mutual fund performance and provide insights for fund managers and investors in developing strategies to navigate volatile market conditions.

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INTRODUCTION

The rapid expansion of Indonesia's mutual fund market over the past decade has marked a significant shift in domestic investment behavior. Equity mutual funds have emerged as a popular investment vehicle among both institutional and retail investors, driven by increased financial literacy, digital access, and professional portfolio management (Ardhani et al., 2020; Qamruzzaman, 2014). However, recent years have also highlighted the vulnerability of equity mutual funds to macroeconomic turbulence. Volatility in interest rates, exchange rates, and competitor stock prices has introduced heightened uncertainty, directly influencing Net Asset Value (NAV) fluctuations and altering investor preferences (Mishkin, 2016).

Figure 1. Growth of Net Asset Value Mutual Fund
Source: OJK, 2024.

The slowdown in NAV growth since 2022—coinciding with sharp interest rate hikes, fuel price adjustments, and currency depreciation—illustrates how macroeconomic instability can erode investor confidence and redirect capital toward perceived safer assets (Sadono Sukirno, 2002; Noviandi et al., 2017). Traditional analyses often focus on the level of macroeconomic variables, yet the pace and unpredictability of their changes—captured through volatility measures—are more relevant in understanding investor behavior in real time. This perspective is particularly important in Indonesia's emerging market context, where capital flows are sensitive to sudden shifts in domestic and global conditions (Mishkin & Eakins, 2018).

Despite the abundance of literature examining macroeconomic impacts on mutual funds, research focusing on macroeconomic volatility as the explanatory variable remains scarce, especially in the Indonesian equity mutual fund segment. Existing studies largely analyze static relationships using levels of macroeconomic indicators, overlooking the information embedded in fluctuations that reflect market uncertainty (Fajarwati et al., 2022; Maulana, 2013). While several studies have examined the effect of macroeconomic variables on mutual fund performance in Indonesia, the majority tend to focus on mean return relationships without explicitly addressing the dynamics of volatility over time.

Furthermore, prior research rarely differentiates between short-term and long-term effects of such volatility, leaving a gap in understanding the temporal nature of risk transmission. This underexplored aspect provides an opportunity to enrich the empirical evidence and offer more comprehensive insights into how volatility in key macroeconomic indicators shapes the performance of equity mutual funds in Indonesia.

This study addresses that gap by employing ARCH-GARCH models to quantify the volatility of key macroeconomic factors before assessing their influence on NAV through the Autoregressive Distributed Lag (ARDL) framework. This approach allows for a more nuanced understanding of how macroeconomic uncertainty transmits into fund performance. This research offers a more refined view of how fluctuations in the macroeconomic environment shape fund performance. The focus on volatility, rather than static levels, not only deepens the understanding of market dynamics but also aligns the analysis with the realities of investor decision-making under uncertainty. This studi aims to analyze the impact of macroeconomic variable volatility on the net asset value of equity mutual funds in Indonesia.

LITERATURE REVIEW

Equity Mutual Funds

A mutual fund is an investment vehicle that pools funds from multiple investors to invest in a diversified portfolio of securities such as stocks, bonds, or money market instruments. The primary objective is to offer professional management and diversification, which can reduce unsystematic risk (Bodie et al., 2014). Equity mutual funds focus primarily on stocks and tend to offer higher potential returns, albeit with higher associated risks. In Indonesia, mutual funds are regulated by OJK and have become an increasingly popular investment option due to digital accessibility and growing financial literacy (Ardhani et al., 2020).

Several studies have found that macroeconomic factors significantly influence mutual fund performance. Maulana (2013) reported that exchange rate negatively impacts the NAV of equity mutual funds in Indonesia, while Noviandi et al. (2017) observed that interest rate changes can trigger NAV fluctuations. In contrast, Fajarwati et al. (2022) found that certain macroeconomic shocks have minimal long-term effects, suggesting that active fund management can mitigate risk exposure.

Net Asset Value (NAV)

Net Asset Value represents the per-unit value of a mutual fund, calculated by subtracting total liabilities from total assets and dividing by the number of units outstanding.

$$NAV = \frac{Total\ Assets - Total\ Liability}{Units\ Outstanding}$$

It is a key indicator of a mutual fund's performance and is updated daily to reflect market changes. NAV fluctuations are influenced by the prices of the underlying securities in the fund's portfolio, which in turn are sensitive to macroeconomic conditions.

Mishkin (2016) explains that asset prices including those in mutual fund portfolios are affected by interest rate changes, exchange rate fluctuations, and investor expectations. Empirical studies by Qamruzzaman (2014) and Ardhani et al. (2020) confirm that NAV is responsive to changes in macroeconomic, with significant short-term and long-term effects.

Portfolio Asset Theory

Portfolio Theory, introduced by Markowitz (1952), formalizes the concept of diversification in investment. He stated that an asset's risk and return should be evaluated based on its contribution to the overall portfolio rather than in isolation. Risk is measured by the variance or standard deviation of returns, and diversification allows investors to optimize returns for a given level of risk by combining assets with low correlations. The theory explains how individuals allocate their wealth in a way that maximizes expected returns and overall wealth, while at the same time minimizing the investment risks they face.

Bodie et al. (2014) emphasize that macroeconomic volatility affects portfolio risk through changes in asset correlations. Empirical evidence by Maulana (2013) and Noviandi et al. (2017) shows that sudden changes in macroeconomic indicators can alter the risk-return profile of mutual fund portfolios, affecting overall NAV performance.

Efficient Market Hypothesis (EMH)

The Efficient Market Hypothesis (Fama, 1970) states that asset prices fully reflect all available information. In a semi-strong form, prices adjust quickly to new public information, such as macroeconomic data releases. For mutual funds, this means NAV should respond rapidly to changes in macroeconomic conditions, as fund managers and market participants incorporate new information into pricing.

However, over time critics have noted that financial markets do not always reflect information perfectly. Phenomena such as excessive volatility where stock prices move far more sharply than their fundamental values illustrate deviations from efficiency. Mishkin and Eakins explain that such movements occur when investors overreact or respond too slowly to relevant information. Evidence from emerging markets like Indonesia (Fajarwati et al., 2022; Ardhani et al., 2020) further supports this, showing that market inefficiencies can delay or amplify NAV responses to macroeconomic volatility, creating both risks and opportunities for active fund management.

Previous research on Indonesian equity mutual funds has largely focused on analyzing macroeconomic indicators using models that capture only static relationships, often overlooking the time-varying nature of risk. In addition, volatility is frequently treated as a secondary factor rather than as a primary variable of interest. This study addresses these limitations by applying a modeling approach that explicitly measures and incorporates volatility over time, while also distinguishing between short-term fluctuations and long-term equilibrium effects. By using a comprehensive dataset covering multiple economic cycles, the analysis is able to capture structural patterns in market behavior that may not be visible in shorter or less detailed studies. From the

reviews of literature and theoretical foundations, a conceptual framework can be developed to explain how macroeconomic variable volatility influences the net asset value of equity mutual funds in Indonesia, as follows:

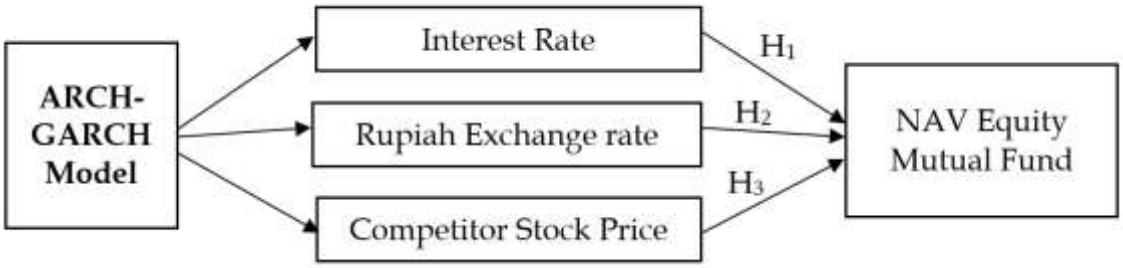

Figure 2. Conceptual Framework

H_1 : An increase in interest rate volatility tends to reduce the net asset value of equity mutual funds.
H_2 : An increase in rupiah exhange rate volatility tends to reduce the net asset value of equity mutual funds.
H_3 : An increase in competitor stock price volatility tends to reduce the net asset value of equity mutual funds.

METHODOLOGY

This research adopts a quantitative approach to investigate the effect of macroeconomic variable volatility on the Net Asset Value (NAV) of equity mutual funds in Indonesia. The analysis focuses on three key macroeconomic variables: interest rates, exchange rates, and competitor stock prices. The population in this study consists of all equity mutual funds registered with the Financial Services Authority (OJK) of Indonesia. The sample comprises aggregated NAV time series data from equity mutual funds covering the period January 2013 to December 2023. These data are combined with monthly macroeconomic indicators, including the Bank Indonesia reference interest rate, the rupiah–US dollar exchange rate, and individual stock price from PT BRI with stock name BBRI as a proxy for competitor stock prices. A purposive sampling technique is applied to ensure that the dataset meets the research requirements in terms of completeness and relevance. Secondary data are obtained from reliable institutional sources, namely the OJK, Bank Indonesia, and the Indonesia Stock Exchange (IDX).

Volatility estimation is performed for each macroeconomic variables using the Autoregressive Conditional Heteroskedasticity – Generalized Autoregressive Conditional Heteroskedasticity (ARCH–GARCH) model, which measures conditional variance to capture fluctuations over time. before applying the ARDL model, the optimal lag length is determined using information criteria such as the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC), ensuring that the selected lag captures the dynamic relationships among variables without overfitting. The estimated volatility values are then incorporated into the Autoregressive Distributed Lag (ARDL) model with the inclusion of lagged terms in ARDL spesification reflects the adjustment process

to examine the effects on macroeconomic volatility and the NAV of equity mutual funds. The empirical is specified as follows:

$$NAV\_LN_t = \alpha + \gamma_t NAV\_LN_{t-1} + \beta_1 VOL\_IR_t + \beta_2 VOL\_IR_{t-1} + \beta_3 VOL\_ER_t + \beta_4 VOL\_ER_{t-1} + \beta_5 VOL\_PCOMP_t + \beta_6 VOL\_PCOMP_{t-1} + u_t \quad (1)$$

Description:

α	: Intersep
$\beta_{1...}\ \beta_6$	: Independent variable coefficient
NAV_LN	: Logaritma natural net asset value equity mutual fund
VOL_IR	: Interest rate volatility
VOL_ER	: Exchange rate volatility
VOL_PCOMP	: Competitor stock price volatility
t	: Time period
t-1	: Previous period
u	: *error term*

RESEARCH RESULT

Table 1. ARCH-GARCH Model Estimation Result

Variable	IR	ER	PCOMP
Constant	0,008247***	14981,77**	-426,2455
ARCH (1)	0,524274***	0,881709***	-0,046165***
GARCH (1)	0,478020***	0,077280	1,063722***
GARCH (2)	-0,134633***	0,189581	
Observasi	129	131	130
AIC	-0,789385	14,28928	13,71631
LM-Test	$Chi^2(1) = 0,6834$	$Chi^2(1) = 0,9328$	$Chi^2(1) = 0,8449$

Note: *, **, *** denote significance at the 10%, 5%, and 1% levels.

Table 1 presents the estimation results of the ARCH–GARCH model for the volatility of interest rates (VOL_IR), exchange rates (VOL_ER), and competitor stock prices (VOL_PCOMP). The significant ARCH and GARCH terms in the variance equations indicate the presence of volatility clustering in all three variables, where current volatility is influenced by past shocks (ARCH) and past volatility (GARCH). The significance of the parameters confirms that volatility is time-varying rather than constant over the sample period. The volatility data used in this study are obtained from the conditional variance generated by the ARCH–GARCH estimation, which captures the dynamic fluctuations in each macroeconomic variable and serves as the independent variables in the ARDL model.

Table 2. Lag Optimal Order Selection

Lag	AIC
0	48.81776
1	41.40945
2	**41.35628***
3	41.48060
4	41.60729
5	41.73138

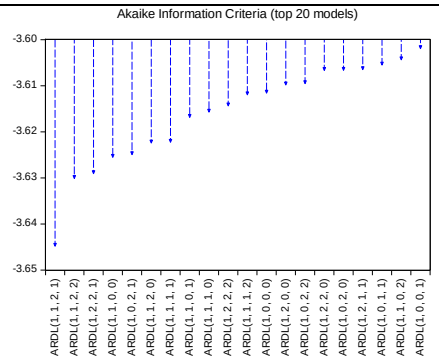

Figure 3. Lag Optimum

In time series analysis, selecting the optimal lag length is essential to ensure that the model captures the dynamic relationships between variables without overfitting. Different lag lengths are tested to evaluate how past values of the dependent and independent variables influence current outcomes. On Table 2. The Akaike Information Criterion (AIC) is used to compare these alternatives, with the preferred lag length being the one that produces the smallest AIC value was obtained at lag 2, making the ARDL (1,1,2,1) spesification the best fitting model for further analysis as the result on Picture 3.

Table 3. ARDL Model Estimation Result

Variable	Coefficient	t-statistic	Probability
NAV_LN(1)	1,022987	43,60753*)	0,0000
VOL_IR	-0,111545	-2,431174*)	0,0165
VOL_IR(-1)	0,093882	2,048309	0,0427
VOL_ER	-1,994929	-1,085771	0,2798
VOL_ER(-1)	1,285823	1,138995	0,2570
VOL_ER(-1)	2,014967	2,079238	0,0397
VOL_PCOMP	-3,045516	-2,696822*)	0,0080
VOL_PCOMP(-1)	2,435401	2,103372	0,0375
C	-0,708554	-0,937505	0,3504
R^2	0,954513		
Adjusted R^2	0,941455		
F-statistic	312,1413		
Prob. (F-statistic)	0,000000		

Note: *) t-statistic ≥ t-table, *one tail*, *a* = 5%.

Table 3 presents the estimation results of the ARDL (1,1,2,1) model, selected based on the lowest AIC value. Hypothesis testing for each coefficient was conducted using a one-tailed (left-tailed) test at a significance level of 5%, with a critical t-table value of –1,65694. The volatility of interest rates (VOL_IR) and competitor stock prices (VOL_PCOMP) have t-statistics greater than t-table and are thus statistically significant, indicating that increases in these volatilities tend to reduce NAV.

In contrast, volatility of exchange rate (VOL_ER) does not meet the critical value in the one-tail test, suggesting that it requires a longer adjustment periode to transmit their impact on equity mutual fund performanc. lagged interest rate volatility (VOL_IR(-1)) and lagged competitor stock price volatility (VOL_PCOMP(-1)), also does not meet the cirirtal value in the one-tail test. Overall, the results highlight that while some macroeconomic volatility variables affect an immediate effect on equity mutual fund performance, while others influence NAVtake more time due to have an impacet because of the adjustment process captured by the ARDL model.

Table 4. Classical Assumption Test Result

Classic Assumption Test	**Probability**	**Conclusion**
Normality Test (Jarque-Bera Test)	0,536021	Residuals are normally distributed
Multicollinearity Test (Variance Inflation Factor)	NAV_LN: 1,30 VOL_IR: 1,43 VOL_IR(-1): 1,44 VOL_ER: 2,32 VOL_ER(-1): 1,82 VOL_ER(-2): 2,11 VOL_PCOMP: 5,70 VOL_PCOMP (-1): 5,23	VIF < 10, no multicollinearity
Heteroskedasticity Test (Breusch-Pagan Godfrey Test)	0,4837	No heteroskedasticity present
Autocorrelation Test (Breusch-Godfrey LM Test)	0,6222	No autocorrelation present

Tabel 4. is the classical assumption tests result that were conducted to ensure the reliability of the ARDL model. The Jarque–Bera test results indicate that the residuals are normally distributed, as shown by the probability value greater than the 5% significance level. The Variance Inflation Factor (VIF) values for all independent variables are well below the threshold of 10, suggesting no multicollinearity problem. The Breusch–Pagan–Godfrey test shows probability values above 5%, indicating the absence of heteroskedasticity. Similarly, the Breusch–Godfrey LM test produces probability values greater than 5%, confirming that there is no autocorrelation in the residuals. These findings demonstrate that the model satisfies the classical assumption requirements, allowing for unbiased and consistent estimation results.

DISCUSSION

Lag of Net Asset Value

The ARDL estimation shows that the lagged value of the Net Asset Value (NAV_LN(-1)) has a positive and statistically significant coefficient in both the short and long run. This suggests that past NAV levels have a strong influence on current NAV, reflecting persistence in equity mutual fund performance over time. The positive relationship indicates that higher NAV in the previous period tends to lead to higher NAV in the current period, which may be due to investor confidence, reinvestment of returns, and momentum effects in the mutual fund market. Elton et al. (2014) also emphasize that the size of managed funds in the past influences expected returns because it provides investment managers with economies of scale to manage the portfolio optimally.

Interest Rate Volatility (VOL_IR)

Interest rate volatility has a negative and statistically significant effect on NAV. The negative impact suggests that fluctuations in interest rates quickly reduce the value of equity mutual funds, possibly due to increased uncertainty in the capital market and shifts in investor preferences toward safer assets. This result supports the theoretical view that rising interest rate risk discourages equity investment by increasing the opportunity cost of holding riskier assets and making fixed-income instruments such as bonds and deposits more attractive. As interest rates fluctuate more sharply, investors often rebalance their portfolios toward safer assets, leading to reduced demand for equity-based mutual funds and downward pressure on their NAV. The findings are consistent with studies by Utami et al. (2010) and Fajarwati et al. (2022), which highlight that increases in interest rates generally have a reducing effect on mutual fund performance.

Furthermore, within the framework of the Efficient Market Hypothesis, the market quickly incorporates expectations of monetary policy changes into asset prices, meaning that even anticipated fluctuations in interest rates can influence investor behavior and fund valuations. This negative relationship underscores the importance for fund managers to monitor interest rate movements closely and adopt strategies, such as sector rotation or partial shifts into defensive stocks, to mitigate the impact of heightened rate uncertainty on portfolio performance.

Exchange Rate Volatility (VOL_ER)

Exchange rate volatility was also found to have no significant effect on equity mutual fund performance. Additionally, the impact of exchange rate fluctuations may take longer to adjust and be reflected in the NAV, as underlying asset valuations and portfolio compositions do not immediately respond to currency changes. Investors also do not instantly withdraw their investments from mutual funds in response to exchange rate movements, particularly when they maintain confidence in the fund's long-term prospects or view the volatility as temporary.

This finding is consistent with Febrina (2014) and Muchtar et al. (2021), who note that mutual fund portfolios in Indonesia generally do not hold substantial foreign assets, thereby limiting the monthly impact of exchange rate

movements. Consistent with prior research, the absence of a strong exchange rate effect underscores the limited sensitivity of domestically focused mutual funds to global currency movements, especially when portfolios are concentrated in industries with minimal dependence on imports or exports. Similarly, Aydemir and Demirhan (2009) argue that the effect of exchange rates can vary across periods and is not always negative, while Rahayu (2021) also finds no significant relationship between exchange rates and mutual fund NAV performance.

Competitor Stock Price (VOL_PCOMP)

Competitor stock price volatility was found to have a significant negative effect on the performance of equity mutual funds, suggesting that increased fluctuations in other asset can lead investors to reallocate their capital away from mutual funds. In the process of maximizing their wealth, when the risk associated with one asset increases, investors tend to seek alternative assets that are perceived as safer and more stable. Rising volatility in competitor stock prices may signal to investors that direct equity investments carry heightened uncertainty, prompting them to diversify into instruments outside equity mutual funds or to shift toward defensive assets. This behavior aligns with portfolio theory, which emphasizes that investors make allocation decisions based on a trade-off between expected return and risk across available investment options. The findings are in line with Mishkin's (2016) explanation that market participants continually assess relative investment opportunities, and when one segment of the market becomes more volatile, capital flows toward assets that better match investors' risk tolerance.

CONCLUSION AND RECOMMENDATION

Based on the result of the analysis reveal that interest rate volatility and competitor stock price volatility have a significant negative effect on NAV, indicating that higher uncertainty in these variables reduces investor interest and asset values in equity mutual funds. Conversely, exchange rate volatility and the lag of NAV do not significantly influence fund performance, suggesting that their effects may be delayed by the domestic composition of mutual fund portfolios and investor behavior that does not react immediately to currency fluctuations or past performance. Overall, the findings highlight that market driven volatility in interest rates and competitive asset prices plays a more prominent role in shaping NAV movements compared to currency fluctuations or performance persistence effects.

Based on the findings of this research, the following recommendations are proposed to inform practice and policy within the equity mutual fund:

1. For Fund Managers
   Proactively monitor interest rate trends and competitor price movements, as these have a direct and significant influence on NAV. Strategies such as sector rotation, shifting to defensive stocks, or partially reallocating assets toward less rate-sensitive sectors can help mitigate performance risks during volatile periods.
2. For Investors

Incorporate interest rate and competitive market conditions into investment decisions when selecting equity mutual funds. Recognizing that exchange rate effects may take longer to materialize, investors should focus on broader economic and competitive signals that more immediately affect NAV.

3. For Regulators
   Strengthen market monitoring systems and provide timely macroeconomic data releases to enhance transparency and help investors and fund managers respond to volatility more effectively. This can also improve investor confidence in the mutual fund market during periods of uncertainty.

ADVANCED RESEARCH

Based on the results and analysis of this research, it is recommended that future studies expand the scope to include other relevant macroeconomic variables, as well as microeconomic variables, in order to provide a more comprehensive understanding of the factors influencing the NAV of equity mutual funds.

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