Do Macroeconomic Factors and Mining Commodity Prices Affect the Mutual Fund Industry? Comparative Evidence of 3 Economic Periods

Austin Ratna Lukita[1], Zaki Anwar Makarim[2], Adinda Maulida Amalia[3], Handy Nugraha[4]
[1,2,3,4]Universitas Muhammadiyah Surakarta, Surakarta, Indonesia
Email: austinratnalukita@gmail.com

Abstract

This study aims to look at the effect of mining commodity prices and macroeconomic variables on the mutual fund industry in Indonesia with a comparison of 3 different economic periods. Background: Indonesia is known as one of the countries with the largest mining reserves in the world. This potential makes Indonesia one of the countries that is a strategic place to invest. However, in recent years there has been global economic turmoil that has a direct impact on investment, such as the US-China trade war, the COVID-19 pandemic, and the Russia-Ukraine war. Based on these events, the question arises whether mining price fluctuations and macroeconomic variables can affect mutual fund investment in Indonesia. Novelty: To the best of the researchers' knowledge, there has been no research linking nickel and copper commodity price variables to the mutual fund industry as well as research using a comparison of 3 economic periods. Research Methods: This research uses time series data analysis with the observation period 2013-2023 and the VECM (Vector Error Correction Model) method with three times of data analysis. This research is based on the utilization of secondary data types obtained from legitimate official Indonesian government institutions (Bank Indonesia, Financial Services Authority, and Central Statistics Agency) and investing.id website. Findings/Results: This study found that macroeconomic variables and mining commodity prices have different short-term and long-term effects on the mutual fund industry in Indonesia. Conclusion: The inconsistency of the variables affecting the mutual fund industry is caused by shocks that occur in different economic periods.

Keywords: *Mutual Fund Industry, Macroeconomics, Mining Material Prices, Global Conflicts, Investment.*

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A. INTRODUCTION

This research investigates the influence of macroeconomic factors and fluctuations in mining commodity prices on the mutual fund industry in Indonesia, using three comparative periods. Mutual funds are an investment medium in the capital market as well as functioning as a means for investors to invest funds to obtain maximum dividends with low risk (Ardhani et al., 2020). In Mutual Funds, there is an Investment Manager who manages funds that investors have invested in mutual fund portfolios in the form of shares, bonds, money markets and others (Nurrahmawati et al., 2021). It was observed that from 2018-2021 the number of Mutual Fund Investors in Indonesia increased quite significantly, as shown in the graph below (Ramyakim & Widyasari, 2022).

Figure 1. Mutual Fund Investor in Indonesia

Source: KSEI (Indonesia Central Security Depository), 2023

According to research from Adnan (2023), economic, social, cultural and international political conditions have a fluctuating influence on to the capital market, especially mutual fund performance. Macroeconomic variables such as inflation and interest rates can affect mutual fund Nett Asset Value (NAV). The higher inflation occurs, the costs of investing will increase, conversely, if inflation decreases, investment costs will decrease, therefore the stability of inflation can affect investment activities (Hartati et al., 2021). Likewise, the movement of interest rates changes every certain period depending on the Indonesian economic situation and the global economy (Prasetyo & Widiyanto, 2019).

Apart from macroeconomic variables, commodity prices also influence the performance of investment instruments (Nordin et al., 2020). Based on data quoted from the United States Geological Survey (USGS) in 2022, Indonesia has the largest ownership of gold, nickel, and copper mining materials in the world. Indonesia is ranked 6th in terms of having the largest gold reserves in the world, with a potential of 2,600 metric tons of gold reserves. Meanwhile, for nickel, Indonesia owns the largest nickel reserves in the world, together with Australia, with a potential of 21 million metric tons. This means that in 2022, Indonesia will contribute 21% of global gold reserves. On the other hand, copper reserves in Indonesia amount to 24 million metric tonnes and are ranked 10th globally.

Another determinant of mutual fund NAV is global environmental conditions (Kurniasih & Johannes, 2017). From 2018 to 2023, there were several major events that affected the global economy. The first event in March 2018 started the trade war between the US and China (Gunawan & Arfah, 2019) and began to subside with the start of implementation of the first phase agreement between the US and China in February 2020 (piie.com). The second event was the Covid-19 pandemic which initially only hit China at the end of 2019 until it finally spread throughout the world (Karina et al., 2021) and was officially announced by WHO as a global pandemic in

2020 and the third phase was the start of Russia's total invasion of Ukraine began on February 24, 2022 (Emelia et al., 2022) and is still ongoing today.

The second event was the Covid-19 pandemic, which hit the whole world. WHO declared Covid a pandemic in 2020 (who.int 2020). The Covid-19 pandemic has had a chain effect that disrupts distribution flows, resulting in an economic crisis, including in Indonesia (Karina et al., 2021). The pandemic has not only impacted the real sector, but also the financial markets (Rahmayani et al., 2021). The capital market in Indonesia also experienced a decline at the beginning of the Covid-19 pandemic and experienced its lowest point a month after the Covid-19 pandemic was confirmed in Indonesia (Marino & Rohanah, 2021). This is a market reaction to the high uncertainty associated with the widespread spread of covid-19 cases around the world, including in Indonesia (Puspitasari et al., 2022). Mining sector shares also experienced a decline, like shares in other sectors. However, in general mining sector share prices tend to follow mining commodity prices (Umar et al., 2023). But in 2020 there was an increase in the prices of mining commodities such as gold, coal, and nickel. Market demand, both domestic and regional, is one of the factors triggering price increases (Maulana et al., 2023).

The third event was Russia's invasion of Ukraine, which was announced by President Putin on February 24 2022, and was initiated due to Russia's concerns about the threat of Ukraine joining NATO (Emelia et al., 2022). As a result of the war, the supply of minerals and metals was disrupted, causing significant price fluctuations (Bakrie et al., 2022). This price crisis will impact the economic sector and will disrupt the global economy for a long time, plus many countries are still recovering from the Covid-19 pandemic which has just subsided (Bakrie et al., 2022). European countries were the regional countries that suffered the most from this war due to the energy crisis that occurred (Hakim & Sadiyin, 2022). The Russia-Ukraine conflict also caused gold prices to rise while stock market prices on the IDX and other countries' stock markets, such as the New York Stock Exchange experienced a decline (Agustina & Barus, 2023). This happens because economic shocks in one country can affect other countries through international openness and cooperation (Retnasih & Herdianti, 2023).

Based on the background explanation above, it shows that the NAV of Mutual Funds has the potential to be influenced by the current economic conditions through macroeconomic factors. Apart from that, world mining commodity prices are no less crucial in potentially influencing mutual fund NAV, considering that Indonesia is one of the largest mining commodity-producing countries. This research aims to compare the influence of macroeconomic factors and mining commodity prices on mutual fund NAV in three different economic conditions, namely normal economic conditions during the US-China trade war, to the Covid-19 pandemic, and the Russia-Ukraine war.

B. LITERATURE REVIEW

Research related to the influence of macroeconomics on NAV of Mutual Funds has been widely carried out, using CPI and Interest Rate variables by; (Nurrahmawati et al., 2021), (Nurjannah et al., 2022), (Sulsitiyowati et al., 2022), and (Oktavinela et al., 2023) state that the CPI and interest rate variables influence the NAV of mutual funds. Based on the literature previously explained, the hypothesis regarding macroeconomic variables on mutual fund NAV is as follows:

H1: Macroeconomics influences NAV of mutual funds

The prices of mining commodities have also been studied in research conducted by (Prasetyo & Widiyanto, 2019), (H. Nugraha et al., 2023), (Renea Shinta Aminda, 2019), (D. P. Nugraha & Putera, 2021), (Ramadhan et al., 2021), (Purnama et al., 2021), (Siregar et al., 2019) using the variables Gold, World Oil and Nickel which states that mining commodity prices influence mutual fund NAV. Based on the literature previously explained, the hypothesis regarding the variable price of mining commodities on mutual fund NAV is as follows:

H2: Mining Commodity Prices Influence Mutual Fund NAV

International economic, sociocultural, and political conditions have a fluctuating influence on mutual fund performance (Adnan, n.d.) and in research by (Kurniasih & Johannes, 2017) also explained that global environmental conditions can determine the NAV of mutual funds. Referring to these two relevant studies, this study aims to assess the influence of the ongoing global economic dynamics on the development of the Mutual Funds Industry. The novelty of this research lies in its ability to compare three important periods in international events, including the normal economic period, the impact of the US-China war, and the Russia-Ukraine war until the emergence of the Covid-19 pandemic. Based on the literature previously explained, the hypothesis regarding the influence of the economic period on the mutual funds industry is as follows:

H3: The economic period influences the Mutual Fund Industry.

C. METHODS

This research uses secondary data obtained from official government institutions and private institutions. Mutual fund industry data was obtained from the official website of the Financial Services Authority. Data on interest rates and consumer price indices were obtained from the official website of the Central Statistics Agency. Data on mining material prices were obtained from the global financial portal managed by the private sector. This research uses a quantitative approach and secondary data in the form of a time series. The three observation periods for this research are: first January 2013 - February 2018, then second March 2018 - August 2020, and third in September 2020 - September 2023.

Time series data processing uses Vector Auto-Regressive (VAR) model analysis techniques or Vector Error Correction Model (VECM) models. The initial tests carried out before estimating VAR or VECM are the stationarity test and cointegration test (H. Nugraha et al., 2023). If the test results are stationary at the first difference and have

cointegration, then the VAR model will be combined with the error correction model to become a VECM model. The test was carried out three times for three specified periods.

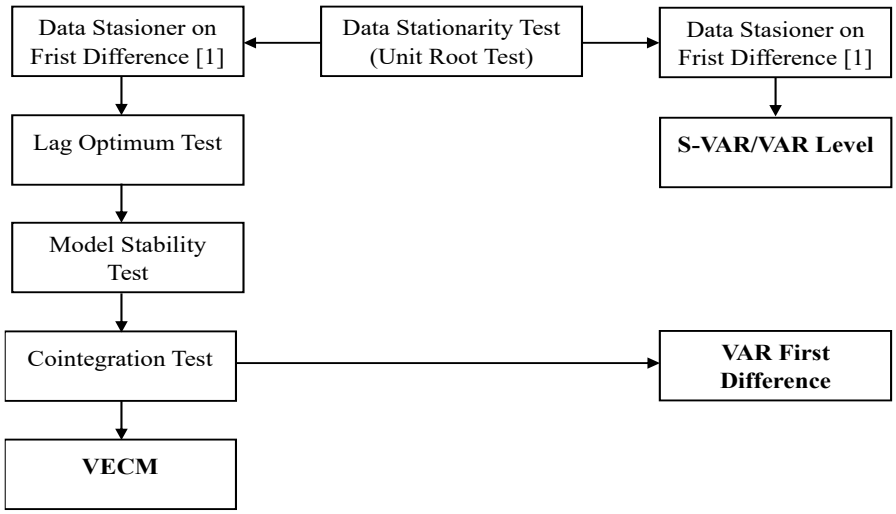

Figure 2. Vecm Analysis Step

Source: VAR and VECM Applications (2020)

The estimated model in this research is as follows:

$$logNAV_t = C_1\, a_{1i} \sum logNAV_{t-k}\; a_{1i} \sum CPI + a_{1i} \sum BIRATE_{t-k} + a_{1i} \sum NICKEL_{t-k} + a_{1i} \sum COPPER_{t-k} + a_{1i} \sum OIL_{t-k} + a_{1i} \sum GAS_{t-k} + \varepsilon_{it}$$

$$\Delta X_t = A_1 \Delta X_{t-k} + a_2 ect + \varepsilon_t$$

Information:

Xt = Vector 8x1 of each variable
a0 = Vector 8x1 intersep
A1 = Matrix 8x1 of coefficients
a0 = Vektor 8x1 Error Correction Model
εt = Vektor 8x1 Error Term
Δ = The data in first differences
t = Period (monthly)
k = lag optimal

D. RESULTS AND DISCUSSION

1. Stationary Test

The stationary test is carried out to ensure that all the variables in the model are stationary so that the VECM model can be used correctly. The test uses a unit root test:

Table 1. Unit Root Test Results at Level

Method	Level Data			First Difference		
	t-Stat	Prob	Conclusion	t-Stat	Prob	Conclusion
Levin, Lin & Cun	-108.966	0.1379	Not Stationary	-277.237	0.0000	Stationary
Im, Pesaran & Shin	-0.73962	0.2298	Not Stationary	-263.427	0.0000	Stationary
ADF	17.1972	0.3730	Not Stationary	473.666	0.0000	Stationary
PP	16.9914	0.3862	Not Stationary	501.263	0.0000	Stationary

The test results in Table 1 show that the data is not stationary at level, with all p values > 0.05. Then, the test was carried out again at the first difference level, and the results showed that the data was stationary, with all p values <0.05. So, testing continues at the stage of determining the optimal lag.

2. Determination of Optimal Lag

Determining the optimal lag is an important stage in the model because it is to find out how much lag or time it takes for the independent variables to respond to the dependent variable.

Table 2. Optimal Lag Determination Test Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-8.609.462	NA	1.10e+53	144.8313	145.0181	144.9072
1	-7.540.146	1976.888	5.04e+45*	127.9352	129.6167*	128.6180*
2	-7.497.979	72.28620	7.38e+45	128.3022	131.4783	129.5919
3	-7.436.421	97.25128	7.96e+45	128.3432	133.0140	130.2399
4	-7.385.817	73.14074	1.07e+46	128.5684	134.7338	131.0720
5	-7.312.272	96.41208	1.02e+46	128.4079	136.0680	131.5185
6	-7.250.740	72.39061	1.28e+46	128.4494	137.6042	132.1669
7	-7.172.986	81.02140	1.32e+46	128.2183	138.8677	132.5426
8	-7.064.658	98.31400*	9.23e+45	127.4733*	139.6173	132.4046

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

Based on the test for determining the optimal lag in table 2, it is known that lag 1 is the selected lag in the optimal lag.

3. Model Stability Test

After selecting the optimal lag, namely lag 1, then a stability test is carried out:

Table 3. Stability Test Result

Root	Modulus
0.978807 - 0.022312i	0.979061
0.978807 + 0.022312i	0.979061
0.944425 - 0.117129i	0.951661
0.944425 + 0.117129i	0.951661
0.856443	0.856443
0.794706 - 0.153990i	0.809487

0.794706 + 0.153990i	0.809487
0.448275 - 0.290498i	0.534172
0.448275 + 0.290498i	0.534172
0.374979	0.374979
-0.250804	0.250804
0.029636 - 0.240795i	0.242612
0.029636 + 0.240795i	0.242612
0.195778	0.195778
-0.041111 - 0.024534i	0.047875
-0.041111 + 0.024534i	0.047875

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

Based on Table 3, it is known that the model is stable and has passed the stability test because the modulus value is less than 1.

4. **Cointegration/Johansen Test**

The Cointegration Test is carried out to indicate a long-term relationship that maintains an equilibrium. This test was carried out using the Johansen approach with Trace Statistics and critical values.

Table 4. Cointegration/Johansen Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.586355	468.5706	143.6691	0.0000
At most 1 *	0.501409	359.1101	111.7805	0.0000
At most 2 *	0.462168	272.8100	83.93712	0.0000
At most 3 *	0.371798	195.9040	60.06141	0.0000
At most 4 *	0.357714	138.2572	40.17493	0.0000
At most 5 *	0.283353	83.35979	24.27596	0.0000
At most 6 *	0.170366	42.04643	12.32090	0.0000
At most 7 *	0.141281	18.88695	4.129906	0.0000

Trace test indicates 8 cointegrating eqn(s) at the 0.05 level
* Denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

All Trace Statistics values > Critical Value means the observed variables are cointegrated with each other. The results are proven to show that there is cointegration, and the variables are stationary at the first difference stage, so the VECM stage can be continued.

5. **Model VECM**

Based on the estimation results in Table 5, the F-statistic is greater than the F-table (6.323>2.18) so that all independent variables in this study simultaneously influence the dependent variable, namely the Net Asset Value of the Mutual Fund Industry. R-squared shows 0.502921, meaning that the independent variables, namely macroeconomics and mining commodity prices, can explain 50.29 percent of the

variation in the dependent variable, while the rest is explained by other variables outside the research.

Table 5 (Normal Economic Period) short-term VECM model estimation results find that the net asset value of the mutual fund industry in Indonesia is influenced by its own variables and the price of gold. This means that changes in the mutual fund NAV variable in the previous period will affect the mutual fund NAV in the current period. Meanwhile, for the long-term estimation results, it was found that changes in interest rates, gold prices, oil prices, and natural gas prices had an effect on mutual fund NAV.

Table 6. (Period of the US-China Trade War) and Table 7. (Economic Period of the Covid-19 Pandemic and the Russia-Ukraine War) have the same estimation results. The short-term VECM model finds that the net asset value of the mutual fund industry in Indonesia is influenced by variables on his own. This means that changes in the mutual fund NAV variable in the previous period will affect the mutual fund NAV in the current period. Meanwhile, for long-term estimates, it was found that macroeconomic changes (CPI and interest rates) and mining commodity prices (gold, nickel, copper, oil, and natural gas) had an effect on mutual fund NAV.

Table 5. Vecm Estimation Results Period I

Variable	Period I			
	Short-term		Long-term	
	Coefficient	T-Statistics	Coefficient	T-Statistics
D(logNAV(-1))	0,11319	-4,13850*		
D(CPI(-1))	0,00042	-1,77860	0,00736	1,82250
D(BIRATE(-1))	0,01151	1,59500	0,12448	4,37430*
D(GOLD(-1))	4,30000	-3,64923*	0,00062	6,13588*
D(NICKEL(-1))	4,10000	-0,76187	0,00072	1,87808
D(COPPER(-1))	6,60000	1,42555	0,00014	1,05745
D(OIL(-1))	0,00057	1,45483	0,00639	-5,42666*
D(GAS(-1))	7,90006	-1,15489	0,00011	7,50665*
R-Squared				0,502921
F-Statistic				6,323466

Table 6. Vecm Estimation Results Period II

Variable	Period II			
	Short-term		Long-term	
	Coefficient	T-Statistics	Coefficient	T-Statistics
D(logNAV(-1))	0,28889	-2,10012*		
D(CPI(-1))	0,00102	-1,43683	0,0006	27,0882*
D(BIRATE(-1))	0,04287	-0,38911	0,0136	-10,5563*
D(GOLD(-1))	0,00016	0,47533	7,4000	31,6068*
D(NICKEL(-1))	0,00011	0,38036	3,5000	-68,6141*
D(COPPER(-1))	2,70000	0,50312	1,6000	-25,2888*
D(OIL(-1))	0,00098	0,03470	-25,2888	31,0340*
D(GAS(-1))	1,20000	-0,50234	1,1000	18,2176*

Table 5. Vecm Estimation Results Period I

Variable	Period III			
	Short-term		Long-term	
	Coefficient	T-Statistics	Coefficient	T-Statistics
D(logNAV(-1))	0,17453	-2,55845*		
D(CPI(-1))	0,00975	-0,31207	0,06386	-4,64118*
D(BIRATE(-1))	0,03791	-1,65473	0,17472	3,21308*
D(GOLD(-1))	6,20000	0,38133	0,00055	8,51263*
D(NICKEL(-1))	1,60000	0,54059	0,00022	-2,45485*
D(COPPER(-1))	7,30000	-1,23805	7,20000	-3,39613*
D(OIL(-1))	0,00051	-0,42262	0,00594	9,58745*
D(GAS(-1))	0,10502	-2,14039	3,00000	-5,57811*

6. Macroeconomics and NAV of Mutual Funds

Based on the results of research that has been carried out, the CPI and Interest Rate variables in the short term from period one to period three have no effect on the NAV of Mutual Funds. This statement is not in accordance with Hypothesis 1, where the CPI and estimated interest rate variables do not have a significant effect on mutual fund NAV.

In the long-term period, one CPI variable has no effect on Mutual Fund NAV, while the Interest Rate t-statistic value is 4.37430 > 1.999624, meaning that the Interest Rate variable has an effect on Mutual Fund NAV. In period two, the CPI t-statistic value is 27.0882 > 2.068658, and the interest rate is -10.5563 > 2.068658. In period three, the CPI t-statistic value is -4.64118 > 2.032245, and the interest rate is 3.21308 > 2 .032245, which means that in the long term in periods two and three, the CPI and Interest Rate variables influence the NAV of Mutual Funds, which means that in the long-term periods two and three, this statement is in accordance with Hypothesis I.

7. Commodity Prices and NAV of Mutual Funds

In period one, gold has a t-statistic of 6.13588 > 1.999624 (t-critical), which means that gold in the short term has an influence on the Net Asset Value (NAV) of Mutual Funds. However, in the long-term, the commodity price variable shows a significant influence, as evidenced by the period one gold, oil, and gold variables each having a t-statistic of 4.37430; 5.42666; and 7.50665 > critical t-value 1.999624.

Then in periods two and three, the results show that all mining commodity price variables (gold, nickel, copper, petroleum, and natural gas) have no effect in the short-term but have an effect in the long term with each t-statistic value in the period two 31.6068; 68.6141; 25.2888; 31.0340; and 18.2176 > 2.068658 and in the third period each t-statistic value was 8.51263; 2.45485; 3.39613; 9.58745; and 5.57811 > 2.032245 (t-critical). Based on the results, it is concluded that in the long-term, this finding is in line with hypothesis II.

8. Economic Period and Mutual Fund Industry

The results of the analysis using the VECM method found that there were differences between conditions during normal economic times and conditions during global economic shocks, namely the US-China trade war and the Russia-Ukraine War. This finding applies both in the short and long term. The results state that when the economy is normal, macroeconomic variables in the short term have no influence on the NAV of Mutual Funds, but in the long-term interest rates influence the NAV of Mutual Funds. Then, in the mining commodity price variable, only gold has an influence in the short term. Meanwhile, in the longterm oil and gas have an influence.

On the other hand, it shows the same results between war periods I and II, namely when trade wars, pandemics, and military wars occurred. Both periods are consistent in that the short-term macroeconomic variables and mining commodity price variables each have no influence on the NAV of Mutual Funds. However, in the long term, the opposite is true, where all macroeconomic variables and mining commodity prices have an influence on mutual fund NAV. Based on the findings that have been presented, it can be concluded that there is consistency between the results of the analysis and the initial hypothesis, which states that economic periods have an influence on the Mutual Fund industry.

E. CONCLUSION

This research investigates the relationship between the influence of macroeconomic factors and mining commodity prices on the net asset value of mutual funds in Indonesia. Research investigating this relationship has been studied by (Putri & Rizal, 2019) and (H. Nugraha et al., 2023), but the variables used by both are still few. In fact, according to the Ministry of Economy and Natural Resources, there are 26 metallic mineral resources that still exist in Indonesia, not including non-metallic mineral resources and gas resources. This means that (Putri & Rizal, 2019) and (H. Nugraha et al., 2023) research cannot yet represent the wider influence of mining material prices and does not provide economic comparisons. Therefore, this study uses more varied variables and adds a more extended period.

Three different time periods, namely the normal economic period, the economic period of the US-China trade war, the pandemic period, and the Russia-Ukraine war, were chosen as observation times. The research results show that not all test results are the same as the proposed hypothesis. First, hypothesis testing in the first, second, and third periods shows that mutual fund variables in the previous year influenced mutual funds in that period. This research is consistent with the findings presented (H. Nugraha et al., 2023).

Second, gold has an effect in the short term, but only in period one during normal economic times. This finding is in line with the findings of (Siregar et al., 2019), (Prasetyo & Widiyanto, 2019), and (H. Nugraha et al., 2023). Third, in the longterm period I, the variables of interest rates, gold prices, oil prices, and natural gas prices together have an influence on the mutual fund industry. This is in line with the

findings of (Prasetyo & Widiyanto, 2019), (Renea Shinta Aminda, 2019), (D. P. Nugraha & Putera, 2021) but contradicts the findings of (Nordin et al., 2020).

Fourth, the results of the analysis for periods II and III show consistent results where macroeconomic variables (CPI and interest rates) and mining commodity variables (gold, nickel, copper, petroleum and natural gas) each influence the mutual fund industry. This means that during an economic crisis, macroeconomic variables and mining commodity prices influence the mutual fund industry in the long term. This is in line with the findings of (Nurjannah et al., 2022), (Renea Shinta Aminda, 2019), (D. P. Nugraha & Putera, 2021), (Ramadhan et al., 2021), (Purnama et al., 2021), (Siregar et al., 2019) but different from the findings of (Yunus et al., 2019), and (Nordin et al., 2020).

The first contribution of this research is that it can provide knowledge that macroeconomic variables and mining commodity prices can influence the mutual fund industry in Indonesia, however, there are inconsistencies in the variables that influence the mutual fund industry caused by shocks that occur in different economic periods. Second, the results of this research can be used as consideration by the government to accelerate the downstream processing of mining commodity materials which in the end can help increase the value of investment in Indonesia. Third, as a consideration for investors to invest in the mutual fund industry during normal economic times or when there is a global economic shock.

The observations made have several limitations, including only using two macroeconomic variables (consumer price index and interest rates). In addition, this research only analyzes observations up to month 9 of 2023 due to data availability constraints which are beyond the researcher's control. It is hoped that future research will use broader macroeconomic variables and add other mining commodity price variables.

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