



Resilience of Mining Stocks: Impact of Gold Price Volatility and Rupiah Exchange Rate on Antam's Investment Performance

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ABSTRACT

This study investigates the effect of gold price volatility and rupiah exchange rate on the stock performance of Antam Public Limited Company during four periods of global uncertainty, namely the US-China Trade War (2018-2020), COVID-19 Pandemic (2020-2022), Russia-Ukraine Conflict (2022-2023), and Israel-Hamas Conflict (2023-2024). Using the Vector Error Correction Model (VECM), this analysis evaluates the short-term and long-term relationships between these variables based on daily time series data. The results show significant variation in the effects between periods. Gold price volatility has a strong effect on Antam shares during the US-China Trade War (short and long run) and the COVID-19 Pandemic (long run), reflecting gold's role as a safe haven asset. In contrast, the rupiah exchange rate dominated the influence during the Russia-Ukraine Conflict (short and long run), driven by a weakening exchange rate that boosted export earnings. In the Israel-Hamas Conflict, both variables were insignificant, indicating the limited impact of the regional conflict. These findings underscore the dynamics of market responses to global crises, providing new insights into the resilience of mining stocks and strategic implications for investors and policy makers in managing economic risks.

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1. INTRODUCTION

Capital markets are essential pillars of the global economy, facilitating capital allocation, investment, and corporate financing (Yao et al., 2020). However, over the past several years, global markets have faced repeated economic shocks, starting with the US-China trade war in 2018, which triggered volatility in commodity and foreign exchange markets (Gunawan & Arfah, 2019). The global COVID-19 pandemic in 2020 further escalated the crisis by disrupting global supply chains and triggering a health and financial emergency (Baker et al., 2020). In addition, geopolitical tensions—such as the Russia-Ukraine war and the Israel-Hamas conflict—have contributed significantly to the growing complexity of market dynamics (Kennedy, 2023) (Romadhon et al., 2024).

These exogenous shocks have led to heightened macroeconomic instability and financial market volatility, undermining investor confidence across various sectors (Ramadhan et al., 2025). In such turbulent conditions, the concept of financial

resilience, defined as the ability of financial assets and sectors to absorb and recover from shocks, has become increasingly important, especially in emerging economies like Indonesia. Among the sectors most vulnerable to external disruptions is the mining sector, which is highly sensitive to commodity price changes, exchange rate fluctuations, and political instability (Adewuyi et al., 2019) (Yu et al., 2023) .

In the Indonesian context, the mining sector remains a significant contributor to national GDP and export earnings, accounting for 10–12% of GDP (Estefania et al., 2021). However, its exposure to global economic cycles makes it highly susceptible to disruptions. For instance, the US–China trade war negatively impacted mineral exports, while the COVID-19 pandemic caused major declines in production and distribution (Nasdian et al., 2020). In contrast, the Russia–Ukraine war pushed global commodity prices upward, boosting Indonesia’s coal exports (Gantz, 2020). During the Israel–Hamas conflict, gold surged in demand as a safe haven asset, influencing investor sentiment in companies like PT Aneka Tambang Tbk (Handayani, 2023) (Nugraheni & Dwiyanto, 2023).

One of Indonesia’s leading mining companies, PT Aneka Tambang Tbk (ANTAM), offers a compelling case for analyzing the financial resilience of mining stocks. ANTAM’s diversified portfolio includes gold, nickel, bauxite, and silver (Maharani & Ningsih, 2025), and its reputation for financial transparency and environmental governance has been noted in recent studies (Larasati & Bhayangkara, 2024)(Lestari et al., 2024). Despite this, the company has experienced fluctuating stock performance during global crises. For instance, its share price declined significantly during the US–China trade war (Sari et al., 2021) recovered with the surge in gold prices during COVID-19 and geopolitical conflicts, and again fluctuated in response to U.S. monetary policy and gold price corrections.

Research (Kurnia Mauliani Ilahi & Sri Prilmayanti Awaluddin, 2024) shows that Antam experienced a decrease in production of around 8-10% during the COVID-19 pandemic period. Notably, the empirical data between 2018 and 2024 shows how ANTAM’s share price has been heavily influenced by the dynamics of global gold prices and the Rupiah’s exchange rate. During the pandemic, for instance, its share price rose from IDR 348 in March 2020 to IDR 3,190 in January 2021, reflecting increased gold demand (Vella Adelia et al., 2024). Meanwhile, the Russia–Ukraine war caused a spike in nickel prices, benefitting ANTAM’s performance (Ibrahim et al., 2024). However, following monetary tightening by the U.S. Fed, the company’s shares saw correction. Similar patterns occurred during the Israel–Hamas conflict (Martins, 2024), where share prices spiked briefly but declined as global gold prices stabilized.

Several studies have investigated macroeconomic determinants of mining sector performance. Research (Tumbur & Sudrajad, 2024) revealed the influence of gold price fluctuations on mining stock performance, while (Feren & Sihwahjoeni, 2022) and (Kurlillah et al., 2023) provided contrasting conclusions regarding the effect of the Rupiah exchange rate on ANTAM’s stock returns. Although these studies offer valuable insights, they often treat gold prices and exchange rates as independent variables, and rarely explore their interactive effects on stock performance during specific periods of global turmoil.

Thus, the key research gap lies in the lack of integrative, time-specific analysis exploring how gold price volatility and Rupiah exchange rate dynamics collectively influence the investment performance of a firm like ANTAM, particularly across different global crisis periods. This study seeks to fill that gap by analyzing the short- and long-term impact of gold price volatility and Rupiah exchange rate fluctuations on ANTAM’s stock performance, using the Vector Error Correction Model (VECM), which captures dynamic relationships among variables (Gunawan, 2022) .

Based on this background, several research problems can be formulated as follows: How does gold price volatility affect the share price of Antam Public Limited Company during the period of economic shocks? How does the change in the rupiah

exchange rate affect the stock price of Antam Public Limited Company during the period of economic shocks? What is the long-term causality and cointegration relationship between the price of gold, the rupiah exchange rate, and the stock price of Antam Public Limited Company?

This study aims to analyze the effect of gold price volatility and exchange rate on Antam's stock price, with a special focus on the period of the US-China trade war, the COVID-19 pandemic, the Russia-Ukraine conflict and the Israel-Hamas conflict. By understanding this relationship, investors and policymakers can make more informed decisions if they want to invest in the mining sector when there is a trade war, health crisis or conflict between countries. In addition, this research can provide valuable insights for management of Antam Public Limited Company in formulating business strategies that are more resilient to future economic shocks. This in turn can contribute to the long-term stability and growth of not only Antam Public Limited Company, but also the Indonesian mining industry as a whole.

2. RESEARCH METHOD

This study uses a quantitative approach with a causal-predictive research design to analyze the effect of gold price volatility and the Rupiah exchange rate on ANTAM's stock performance. Daily time series data were collected from March 2018 to December 2024, covering major global disruptions including the US-China trade war, COVID-19 pandemic, Russia-Ukraine war, and Israel-Hamas conflict. The dataset consists of 1,655 trading days.

Data sources include official and reliable platforms: ANTAM's stock prices and gold price data were obtained from www.investing.com and the Indonesia Stock Exchange (www.idx.co.id), and exchange rate data from Bank Indonesia (www.bi.go.id).

The variables include daily gold prices in USD/oz, the IDR/USD exchange rate, and ANTAM's daily closing stock price in Rupiah. These variables were processed using EViews 12 software. According to (Arfah et al., 2023) The analysis involved unit root testing using the Augmented Dickey-Fuller (ADF) method, lag length selection via AIC and SIC, and cointegration testing using the Johansen approach. Granger causality tests and the Vector Error Correction Model (VECM) were employed to assess both the short- and long-term relationships among variables. This method enables a comprehensive understanding of macroeconomic impacts on mining stocks during periods of high uncertainty.

3. RESULTS AND DISCUSSIONS

3.1 Results

The method used is Vector Autoregression with the Augmented Dickey-Fuller Test for the unit root test in this study. In the ADF test, if the variable is not stationary at the level, it must be continued with the unit root test at the 1st difference, with the same procedure as the level.

Table 1 Stationarity Data

Period	Variables	Root Unit	ADF Test Statistic	Critical Value 5%	Prob.	Ket
US-China Trade War (01-03-2018 to 19-03-2022)	Antam	At Level	-0.506	-2.867	0.887	Non-stationary
		1 st Difference	-22.38	-2.867	0.0000	Stationary
	Gold	At Level	-22.10	-2.867	0.0000	Stationary
		1 st Difference	-13.59	-2.867	0.0000	Stationary
	Kurs	At Level	-0.592	-2.867	0.869	Non-stationary
		1 st Difference	-11.44	-2.867	0.000	Stationary
Covid-19 Pandemic (20-03-2020 to 23-	Antam	At Level	-1.640	-2.867	0.461	Non-stationary
		1 st Difference	-11.72	-2.867	0.000	Stationary

02-2022)	Gold	At Level	-19.50	-2.867	0.000	Stationary
		1 st Difference	-14.23	-2.867	0.000	Stationary
	Kurs	At Level	-5.148	-2.867	0.000	Stationary
		1 st Difference	-20.96	-2.867	0.000	Stationary
Russia-Ukraine Conflict (24-02-2022 to 06- 10-2023)	Antam	At Level	-1.891	-2.868	0.336	Non-stationary
		1 st Difference	-18.411	-2.868	0.000	Stationary
	Gold	At Level	-19.53	-2.868	0.000	Stationary
		1 st Difference	-17.52	-2.868	0.000	Stationary
	Kurs	At Level	-1.629	-2.868	0.466	Non-stationary
		1 st Difference	-16.867	-2.868	0.000	Stationary
Israel-Hamas Conflict (09-10-2023 to 30- 12-2024)	Antam	At Level	-2.486	-2.871	0.119	Non-stationary
		1 st Difference	-16.269	-2.871	0.000	Stationary
	Gold	At Level	-18.120	-2.871	0.000	Stationary
		1 st Difference	-12.178	-2.871	0.000	Stationary
	Kurs	At Level	-1.551	-2.871	0.506	Non-stationary
		1 st Difference	-9.258	-2.871	0.000	Stationary

The standard to determine whether a data is stationary or not is the ADF value, if the ADF value is greater than the critical value, then H_0 is accepted which means there is a unit root and is not stationary. Conversely, if the ADF value is smaller than the 5% critical value, then H_0 is rejected which means there is no unit root and the data is stationary. Based on table.1 it can be concluded that all data are stationary at the 1st different level. Because it has ADF value < Critical value and has P value < 5%.

In using VAR modeling, the optimal lag test is very important to eliminate auto correlation symptoms, the optimal lag test uses the AIC value, as shown in the following table.

Table 2 Optimum Lag Test

Period	Optimal Lag (Minimum AIC)	AIC value
US-China Trade War	1	9.213411
COVID-19 Pandemic	6	11.42151
Russia-Ukraine Conflict	7	10.54137
Israel-Hamas Conflict	1	9.909288

The market reaction to changes in gold price and rupiah exchange rate is relatively fast and directly reflected in Antam's share price. Lag 1 also depicts volatility that is quickly absorbed, consistent with the persistent nature of trade tensions but not domestic macroeconomic complexity.

The COVID-19 pandemic shows that the market response to macro variables is slow and gradual. This is logical due to high uncertainty. Investor reaction is not immediate because the shock is multidimensional and not linear. Lag 6 shows that the adjustment process takes longer.

The Russia-Ukraine conflict shows that the impact of the Russia-Ukraine geopolitical conflict on the Indonesian market, particularly Antam's share price, is slow but persistent. Commodity prices such as nickel have experienced a gradual increase. Investors need time to digest global market conditions and their impact on Antam public limited company as a major nickel exporter.

The Israel-Hamas conflict showed its quick impact, as it directly affected the sentiment of the gold market and investors' reaction to the commodity occurred within a short period of time as they already had experience from previous crises.

Table 3 Stability test

Period	Stability Status	Technical Description
US-China Trade War	Stable	All root modulus < 1
COVID-19 Pandemic	Stable	All root modulus < 1
Russia-Ukraine Conflict	Stable	All root modulus < 1

Period	Stability Status	Technical Description
Israel-Hamas Conflict	Stable	All root modulus < 1

Table 3 shows the results of the VAR/VECM model stability test for four periods of economic shocks, namely the US-China Trade War, COVID-19 Pandemic, Russia-Ukraine Conflict, and Israel-Hamas Conflict. This test is conducted to ensure that all characteristic roots of model are inside the unit circle, which is the main requirement for the model to be considered dynamically stable. The results show that all models in each period have a root modulus < 1, which means that the entire system is stable and suitable for further analysis such as impulse response function, variance decomposition, and forecasting. The stability of this model also reflects that despite significant fluctuations in the price of gold, the rupiah exchange rate, and the price of Antam shares due to external pressures such as geopolitical crises and pandemics, the market shows good structural adjustment capabilities. Thus, the model used in this study has met the validity requirements to analyze the dynamics of the relationship between variables in the short and long term econometrically.

Table 4 Cointegration Test

Period	Cointegration Test Results	Conclusion
US-China Trade War	Trace and Max-Eigen > CV	There are 1 or more long-term relationships
COVID-19 Pandemic	Trace and Max-Eigen > CV	There are 1 or more long-term relationships
Russia-Ukraine Conflict	Trace and Max-Eigen > CV	There are 1 or more long-term relationships
Israel-Hamas Conflict	Trace and Max-Eigen > CV	There are 1 or more long-term relationships

The consistency of the long-run relationship across all periods suggests that despite the of gold prices and rupiah exchange rates, there is a structural equilibrium between the three variables. In other words, Antam's share price moves in a long-term equilibrium along with the gold price and exchange rate. This also justifies the selection of the VECM model as a method of analysis, because the variables involved are 1st difference and have a long-term relationship.

Table 5 Granger Causality Test

Period	Gold Price → Antam Share Price	Antam Share Price → Gold Price	Kurs → Antam Share Price	Antam Share Price → Kurs	Conclusion
US-China Trade War	Significant (p<0.05)	Not Significant	Not Significant	Significant (p<0.05)	Gold→Antam Share→Equities
COVID-19 Pandemic	Not Significant	Not Significant	Not Significant	Not Significant	No causal relationship
Russia-Ukraine Conflict	Significant (p<0.05)	Not Significant	Not Significant	Significant (p<0.05)	Gold→ Antam Share →Equities
Israel-Hamas Conflict	Not Significant	Not Significant	Significant (p<0.05)	Not Significant	Kurs → Antam Share

From table 5, it can be found that there are variations in the causality relationship between variables in each period of the global crisis. In the period of Trade War and Russia Ukraine Conflict, there is a causality relationship from the price of gold to the price of antam shares and the price of antam shares also affects the rupiah exchange rate. This shows that in that period the price of gold has a role as a leading indicator of the performance of mining sector stocks, especially antam. In contrast, during the covid-19 period no causality relationship was found, this could reflect the high global uncertainty that caused the relationship between financial indicators to be unstable. Unlike the previous period, in the Israeli-Hamas conflict, a causal relationship

was found from the rupiah exchange rate to the price of antam shares. This means that fluctuations in the rupiah exchange rate have a role in influencing the price of antam shares, while the price of gold does not show a significant effect. This finding shows that the sensitivity of antam stocks to macroeconomic variables can be different depending on the context of the ongoing crisis.

Table 6 Comparison of Long-Term and Short-Term VECM Estimation Results

Period	Long Term		Short Term	
	Gold Price → Antam Shares	Kurs → Antam Shares	Gold Price → Antam Shares	Kurs → Antam Shares
US-China Trade War	Significant Effect	No Significant Effect	Significant Effect	No Significant Effect
COVID-19 Pandemic	Significant Effect	No Significant Effect	No Significant Effect	No Significant Effect
Russia-Ukraine Conflict	No Significant Effect	Significant Effect	No Significant Effect	Significant Effect
Israel-Hamas Conflict	No Significant Effect	No Significant Effect	No Significant Effect	No Significant Effect

a. Variable: Gold Price

Based on the estimation results shown in table 6, it is known that during the period of the US-China Trade War, the price of gold has a significant effect on the price of antam shares both in the long and short term. However, during the Covid-19 Pandemic, the price of gold had a significant effect on the price of antam shares in the long but not in the short term. Meanwhile, during the period of the Russian Ukraine Conflict and the Israeli Hamas Conflict, the price of gold had no significant effect on the price of antam shares in the long or short term.

Thus, in the As-China Trade War Period the alternative hypothesis (H_1) is accepted for both timeframes. This means that gold price volatility has a real and consistent impact on Antam stock price movements, which can be explained by gold's role as a safe haven asset during heightened global trade tensions. Then in the Covid-19 Pandemic period, the alternative hypothesis (H_1) is accepted in the long run, while the null hypothesis (H_0) is accepted in the short run. This suggests that gold price volatility has a slower and structural effect on Antam's share price, possibly related to the perception of gold as a long-term hedge, while operational disruptions during the pandemic weaken its effect in the short run. Furthermore, in the period of the Russian Ukraine Conflict and the Israeli Hamas Conflict, the null hypothesis (H_0) is accepted for both timeframes. This is interesting because although gold is often a safe haven asset during geopolitical conflicts, its effect on Antam appears to be muted, perhaps because the market focus shifted to other commodities such as nickel which the Company also produces and the effect was not strong enough to substantially affect Antam's share price, perhaps because the impact of these conflicts was more regional and on the company's operations.

b. Variables: Rupiah Exchange Rate

Based on the estimation results shown in table 6, it is known that during the period of the US-China trade war, the Covid-19 pandemic and the Israeli-Hamas conflict, the exchange rate did not have a significant effect on the price of Antam shares in both the long and short term. However, in the period of the Russian-Ukrainian conflict, the exchange rate had a significant effect on the price of Antam shares both in the long and short term.

Thus, in the period of the US-China trade war, the COVID-19 pandemic and the Israeli-Hamas conflict, the null hypothesis (H_0) is accepted for both time periods. This indicates that fluctuations in the rupiah exchange rate were not a major determinant in the dynamics of Antam's share price in this period, possibly due to relatively maintained

domestic monetary stability. Meanwhile, in the period of the Russia-Ukraine Conflict, the alternative hypothesis (H_1) is accepted for both time periods. This means that fluctuations in the rupiah exchange rate are a key factor affecting Antam's share price, possibly due to the impact of the weakening rupiah which increases the value of the company's export revenues in local currency.

Table 7 Implicit Response Function

Period	Dominant External Factors	Conclusion
US-China Trade War	Gold Price	Positive then negative and stable in the 2nd period
COVID-19 Pandemic	Kurs	Positive then negative and stable
Russia-Ukraine Conflict	Gold Price	Positive, highest in the 2nd period
Israel-Hamas Conflict	Gold Price	Positive and stable, highest in the 4th period

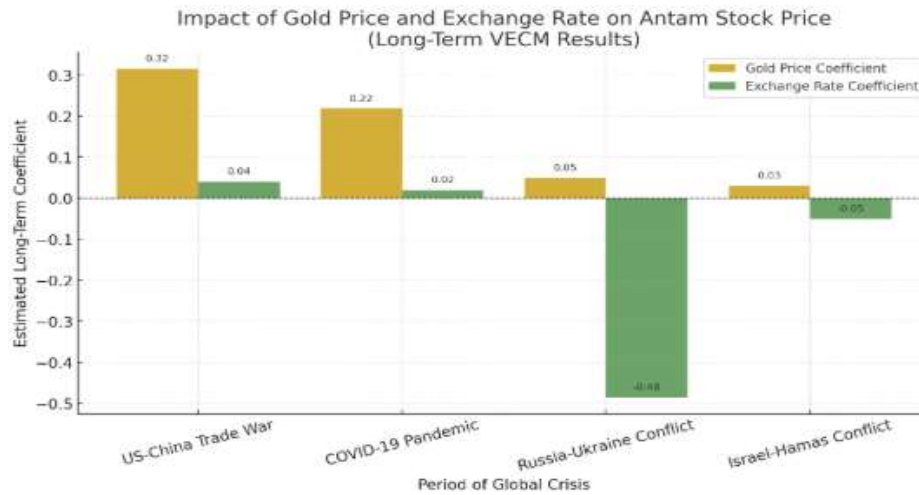
Table 7 shows that in all four periods, the gold price tends to increase (positive effect) during geopolitical and economic crises, while the exchange rate is more prone to temporal fluctuations influenced by monetary policy and liquidity demand. The stability of gold prices in the final phase of each period reflects the market's adaptation to ongoing risk dynamics.

Table 8 Variance Decomposition

Period	Gold Contribution	Kurs Contribution	Own Share Contribution	Dominance of External Factors
US-China Trade War	<1.13% (increased in the 3rd period)	<1%	98.75%	Gold Price
COVID-19 Pandemic	1.54% (stable at 8th period)	<0.5%	98.12%	Gold Price
Russia-Ukraine Conflict	10.18%	1.09%	88.73%	Gold Price
Israel-Hamas Conflict	16.54% (increased in the 10th period)	2.45%	81.02%	Gold Price

Table 8 shows that in the four periods of the global crisis, fluctuations in Antam shares were mainly influenced by internal factors (contribution >80%), such as company performance and domestic investor sentiment. However, external factors also showed a unique pattern. Gold prices became the dominant external influence, with contributions increasing with the duration and intensity of the crisis. In the Israel-Hamas conflict, gold accounted for 16.54% of the variance, the highest among all periods. Due to its role as a safe-haven asset during geopolitical uncertainty. Meanwhile, the Russia-Ukraine conflict showed a moderate gold contribution of 10.18%, due to global commodity volatility. In the periods of the US-China Trade War and the COVID-19 Pandemic, gold's contribution was lower <1.5%, reflecting the limited impact of the crisis on the commodity channel. The exchange rate consistently provided a minimal influence of <2.5% across all periods, suggesting exchange rate fluctuations are not the main channel of external risk transmission. These findings confirm ANTAM's resilience to external shocks, although exposure to gold makes it vulnerable to commodity price volatility during large-scale geopolitical crises. Investors are advised to prioritize the analysis of internal factors, but still monitor global gold dynamics, especially in geopolitical situations that have the potential to disrupt commodity markets.

3.2 Discussions



a. US-China Trade War (2018-2020)

During this period, the gold price had a statistically significant impact on Antam's stock price both in the short and long term. The long-term regression coefficient was 0.315, suggesting that a one-unit increase in the gold price led to an estimated 0.315-point increase in Antam's stock price. This reinforces gold's role as a safe haven during global economic tensions. The practical implication is that investors should actively monitor gold price trends during periods of international trade conflict, as rising gold prices can have a positive impact on the valuation of mining stocks such as Antam.

b. COVID-19 Pandemic (2020-2022)

During this period, the gold price had a significant long-term effect (0.218) on Antam's stock, but no short-term impact. This reflects a delayed market adjustment, likely due to operational disruptions and investor uncertainty during the height of the pandemic. The practical implication is that While short-term price signals may be muted, long-term investors should consider the stabilizing influence of gold on mining stocks under prolonged global uncertainty.

c. Russia-Ukraine Conflict (2022-2023)

While short-term price signals may be muted, long-term investors should consider the stabilizing influence of gold on mining stocks under prolonged global uncertainty. The practical implication is that Exchange rate movements are crucial during export-driven commodity booms. Investors are advised to monitor the Rupiah closely, especially during conflicts that affect global supply chains and export revenues.

d. Israel-Hamas Conflict (2023-2024)

Neither the gold price nor the exchange rate had a statistically significant effect. This suggests that localized regional conflicts may not strongly influence Indonesia-based mining companies. The practical implication is that for conflicts with limited global economic spillover, investors should place more emphasis on corporate fundamentals and domestic factors than on external macroeconomic signals.

4. CONCLUSION

This study analyzes the effect of gold price volatility and the Rupiah exchange rate on the stock performance of Antam Public Limited Company during four global crisis periods. The results from the Vector Error Correction Model (VECM) reveal that gold price volatility significantly influenced Antam's stock during the US–China Trade War (short and long term) and the COVID-19 Pandemic (long term), reflecting gold's role as a safe-haven asset. Meanwhile, the Rupiah exchange rate had a strong impact only during the Russia–Ukraine Conflict, driven by currency depreciation that boosted export revenues. No significant effects were found during the Israel– Hamas Conflict, suggesting limited influence of regional crises on Antam's stock.

These findings imply that investment decisions in the mining sector should consider the specific nature of each crisis. Investors are advised to monitor global gold prices and exchange rate fluctuations depending on the prevailing global context. While the study offers practical insights, its limitations include a focus on a single company and the exclusion of other macroeconomic factors such as interest rates and investor sentiment. Future research should expand the scope to include more companies, broader variables, and alternative modeling approaches to provide deeper insights into the resilience of mining stocks during global uncertainties.

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