

THE ROLE OF GOLD AS SAVE HAVEN OR DIVERSIFIER INVESMENT IN INDONESIA

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Abstract: This research is based on the phenomenon of increasing gold transactions in the early 2020 pandemic as an alternative investment. This study aims to answer whether gold acts more as an alternative investment tool or as a diversifier, or is it still relevant as a hedging tool or a safe haven. This study will explore a number of main variables, namely: gold prices, investment interest rates, liquid stock prices, exchange rates and consumer price levels. The data analysis is time-series data with a time span of January 2018 to October 2020. The analytical method used is pairwise correlation and cross-correlation. The results showed, through pairwise correlation analysis, it can be concluded that the gold price variable is more worthy of being called a good store of value or safe haven than its role as an alternative investment or diversification. On the other hand, based on a cross-correlation analysis involving time-lag, the gold price expectation variable for next year has a strong complementarity with the expected investment interest rate variable as well as the expected exchange rate variable. Meanwhile, the relationship between the expected gold price variable and the expected liquid stock price variable, which is often used as an investment tool indicator, has a very strong substitution or diversification relationship.

Keywords: *Gold, Safe Haven, Investment Diversifier, Cross-Correlation, Forecast Evaluation.*

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1. Introduction

The Covid-19 which has developed into a pandemic in various countries has caused many investors to have high concerns because the effects of the pandemic have made the change from a health crisis to an economic crisis. The existence of the world economic crisis has caused many people to think about saving their assets so that their value does not decrease. For this reason, they are thinking about replacing assets that tend to decline in value with other assets such as gold, for example.

A company engaged in providing digital platforms for gold transactions stated that until October 2020 there was an increase in gold transactions by 30%, even at the beginning of the pandemic, between April-June 2020 there was an increase of 50%. The gold price soared from Rp. 762,000/gram at the end of 2019 to Rp. 1,065,000/gram in August 2020 (Kontan, 2020; Sahabat Pegadaian, 2021). Gold is a precious metal that attracts the interest of various groups,

not only regarding its beauty but also the value of gold itself. Gold can be used as jewelry, it can also be used as currency, input in the industrial sector, as well as an investment tool.

In the discussion of gold as an asset, the debate actually includes two terms, namely whether gold acts more as a safe haven asset or as an investment diversifier. In this study, the two terms are compared with a store of value as a safe haven and an investment tool as a diversifier.

A store of value is an asset that is able to maintain the value it contains, is not easily depreciated. Gold and other precious metals are good stores of value because of their long shelf life. A country's currency must be a reasonable store of value for its economy to function smoothly. In other words, an object can be used as a store of value if the object has a relatively stable value and is less likely to depreciate. In the case of gold, based on graph 2.1, the price of gold, at least until 2010 qualified as a store of value. However, in the following period, relatively high fluctuations were seen, so gold became too risky to be considered a store of value. Therefore, the idea of using gold as an investment tool began to emerge.

The results of Fernando's research (2017) state that one of the reasons for the increasing interest in gold investment is the perceived risk in the economy. Risk management is very important in today's era which is full of uncertainty in terms of economy, finance and politics. At the same time, increasing correlations between traditional diversification roles make diversification more difficult. In Sweden, gold is a great diversification in the equity portfolio. So, according to Fernando, gold is an investment tool, while according to Ritholtz (2016) gold is not an investment tool but gold is a store of value and currency.

Historically gold has been seen as more attractive investment than stocks and bond or other assets classes, not only for the positive returns but also as save haven in time of difficulty (Kovinska, 2014).

Several studies on gold and other assets, have mixed results. Faugere and van Erlach (Faugere and Van Erlach, 2004), (Shakil *et al.*, 2018) and (De Cnif, 2019) conclude that gold acts more as a hedging tool or a haven, when the economy is in a state of uncertainty until it penetrates the stock market. Faugere and van Erlach (2004) compare the price of gold with stock prices, exchange rates and inflation. According to Faugere and van Erlach (2004) gold in normal conditions has various roles, but in turmoil conditions, gold is more visible in its role as a hedging tool or acts as a safe haven. De Cnif (2019) argues that the belief that gold acts as a safe haven does not apply when the economic and stock market turmoil is extreme so that the ambiguity of gold's role is very obvious.

Similar studies with different results were conducted by Ibrahim and Baharom (2011), and Robiyanto (2018). They have a general conclusion that gold is able to make a significant contribution as an investment tool when the economy leads to uncertainty to penetrate the capital market conditions. In line with this conclusion, according to Robiyanto (2018), the role of gold in the Indonesian and Malaysian economies illustrates the diversification of investment, both in government and corporate bonds, because stocks themselves have shown hedge properties with the magnitude of the phenomenon of co-movement with related factors.

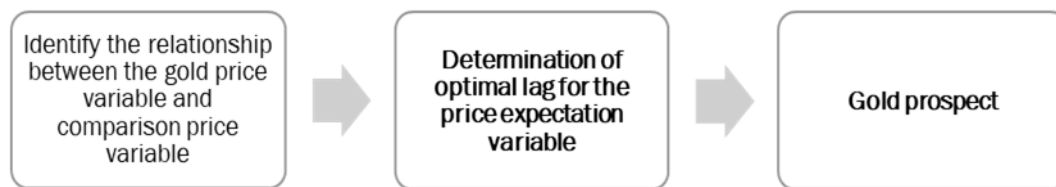
Agha et al (2015) state that there are two ways to invest in gold, namely by investing in physical gold and paper gold. They tested the gold status in the Islamic perspective, qualitative research method, tested operational, contemporary application and the issue of Shariah compliance. Based on Shariah compliance, out of seven banks, only one bank offers Shariah-approved gold savings accounts. Recent trends show that Malaysians are increasingly turning to gold investment as one of the sharia-compliant mechanisms to protect wealth.

Toraman et al (2011) used data from June 1992 - March 2010 namely data on oil prices, USA Exchange rate, USA inflation rate, USA real interest rate. The results stated that the highest correlation was found between gold prices and the USA exchange rate, where the relationship between the two was negative. The second highest correlation is between the gold price and the oil price (positive correlation).

2. Research Method

To determine whether gold assets act as a haven or diversifier investment in Indonesia, the calculation and analysis process is designed as follows:

Figure 1. Analysis flowchart



Source: Author's Model

Stage I: Identify the Relationship between Gold Price Variables and Comparative Price Variables.

This stage is an attempt to determine the pattern of movement between the gold price variable and other variables identified as variables related to diversifier investment or haven activities. Activities used to describe investment activities are Investment Credit Interest, LQ45 Index, while the variables that describe safe haven activities are inflation and exchange rates.

Stage II: Identify price movements.

Identified by cross-correlation using optimal lag.

Stage III: Gold Prospect.

This stage is the forecasting stage of the price variable, whose value is then compared to find out how relevant the placement of gold is as a safe haven or diversifier investment. The research method explains the design of activities, scope or objects, main materials and tools, places, data collection techniques, operational definitions of research variables, and analysis techniques.

2.1. Data and data sources

Data were collected from various sources (table 1). The observed data period was 2018.1 – 2020.10 (34 monthly data). The data used in this study are as follows:

Table 1. Data and data sources

NO.	Variables	Operational definition	Sources
1	Gold Price (Gold)	Antam Gold Price per troy ounce	Inbizia
2	Investment Credit Interest (Interest)	Commercial Bank investment loan interest rates	Bank Indonesia
3	Stock Price Index (LQ45)	Calculation of 45 stocks selected by performing several selection criteria that are adjusted every six months	Yahoo finance
4	General Price Level (Inflation)	Changes in the consumer price index	Badan Pusat Statistik

5	Exchange Rate Rp/USD (Exchange Rate)	Rupiah value per US\$ 1	Badan Pusat Statistik
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Source: own research

2.2. Forecasting basic model

There are various forecasting models that can be applied to time series data. There are at least four forecasting models (Agung, 2019), namely: (1) lag-variable basis, LV(p); (2) base Lag-Variable ARMA, LVARMA (p, q, r); (3) basis Threshold GARCH, T-GARCH (p, q, r); (4) Basis Instrumental Variables Model. This study uses the first basis, namely the lag variable (LV) by considering the simplicity of the model and data requirements. LV forecasting basis has two alternatives, namely: (a) a dynamic forecast, and (b) a static forecast. In general, the LV forecasting model is based on the following equation:

$$Y_t = C(1) + C(2) Y_{t-1} + \dots + C(p+1)Y_{t-p} + \mu_t \quad (\text{Equation-1})$$

The LV model does not consider errors in determining the forecast value, so $\mu_t = 0$. The length of time-lag is an important factor in the forecasting model. The length of time-lag (t-p) that is carried out is basically a subjective consideration of the researcher. One of the considerations is to use optimum lag. Some of the optimum lag indicators used are Likelihood Ratio (LR), Final Prediction Error (FPE); and several Information Criteria models, consisting of Akaike (AIC), Schwarz (SC), and Hanan-Quinn (HQ).

A Dynamic Forecast vs A Static Forecast. The forecast values of the two models are based on a similar equation:

$$Y_{t+k} = C(1) + C(2) Y_{t-1} + \dots + C(p+1)Y_{t-k-1} \quad (\text{Equation-2})$$

The two forecast models will have the same value in the initial period of their multi-period forecast. However, both will have differences in the continuation period. This difference will also appear when determining the bandwidth of the forecast. The dynamic forecast bandwidth will follow the error distribution that occurs dynamically by following the standard deviation pattern, as well as the static forecast will follow the error distribution statically.

Cross Correlation and Correlogram. Cross correlation is a method of measuring two variables to measure association relationships that occur at several specified time points. The two variables measured have different roles. The first variable acts as a driver variable while the second variable acts as an output. Mathematically, the cross correlation is not much different from the Pearson Product Moment correlation.

Equation-3: the Pearson Product Moment correlation

$$\rho_{xy}(\ell) = \frac{\sum_{i=0}^{N-1} (x_i - \bar{x}) * (y_{i-\ell} - \bar{y})}{\sqrt{\sum_{i=0}^{N-1} (x_i - \bar{x})^2} \sqrt{\sum_{i=0}^{N-1} (y_{i-\ell} - \bar{y})^2}}$$

The degree of strength of the association between the two variables between (-1.00) to (+1.00) is called the correlation coefficient. The correlation coefficient is closer to the value of

(1), the more it will show the identicalness of the two variables at a certain point in time. While a negative value leads to an understanding that X leads Y and if a positive value means X lags Y. Investment analysts often use this method to understand the movement of these two types of investments in order to determine diversifiers investment.

Forecast Evaluation. Forecast Evaluation is a comparison of the forecast value with the actual value of the target value during the forecast period. The standard procedure used is to set aside some historical data to be used as a comparison sample for actual and estimated values. EViews allows the use of comparison samples to: (1) make statistical evaluations of estimates to provide a measure of forecast accuracy, and (2) perform combination tests to determine whether the combined mean of estimates outperforms single estimates.

The forecast evaluation model used is: (1) Root Mean Square Error (RMSE) and (2) Theil Inequality Coefficient (TIC). The RMSE is the standard deviation of the residuals, which reflects a measure of how far from the data points the regression line is. The RMSE is a measure of how spread out this residual is or gives an explanation of how concentrated the data is around the line that best fits. The smaller (closer to zero) the better the forecast results. The RMSE formulation is as follows:

Equation-4: Root Mean Square Error (RMSE)

$$\sqrt{\frac{\sum_{t=T+1}^{T+h} (y_t - \hat{y}_t)^2}{h}}$$

Theil Inequality Coefficient (TIC) otherwise known as Thiel's U, provides a measure of how well the time series of estimated values compare to the corresponding time series of observed values. Statistics measure the extent to which a time series ($\{X_i\}$, $i = 1, 2, 3, \dots, n$) differs from one another ($\{Y_i\}$, $i = 1, 2, 3, \dots, n$). Thiel's U is calculated as:

Equation-5: Theil's U

$$\frac{\sqrt{\frac{\sum_{t=T+1}^{T+h} (y_t - \hat{y}_t)^2}{h}}}{\sqrt{\frac{\sum_{t=T+1}^{T+h} y_t^2}{h}} + \sqrt{\frac{\sum_{t=T+1}^{T+h} \hat{y}_t^2}{h}}}$$

The smaller Theil value (the closer to zero) the better the forecast value.

3. Result and Discussion

The five variables used in this analysis are price variables that have three sizes. The interest rate and inflation variables have the form of a percentage (%), the LQ45 variable has the form of an index, and the gold price and exchange rate variables have the form of money units. The form of this measure is important to be able to interpret descriptive statistics on it.

Interest rate, Gold Price, LQ45 and Inflation variables have a normal distribution because there is a tendency for the movement of these price variables to be driven by natural movements (according to market movements). Meanwhile, the exchange rate variable often contains an

element of intervention from the monetary authority in responding to the natural movements of the foreign exchange market. Policy variables, such as the exchange rate, are very reasonable if they show abnormal symptoms.

Table 2. Mean and dispersion data

	Mean	SD	Distribution			Samples
			Skewness	Kurtosis	JB (Prob)	
Interest	10.032	0.466	-0.983	2.544	5.766 (0.056)	34
D(interest)	-0.044	0.078	0.250	4.677	4.211 (0.122)	33
Gold	1461.317	232.310	0.829	2.524	4.217 (0.121)	34
D(Gold)	16.238	52.113	1.196	4.489	10.911 (0.004)	33
LQ45	930.660	110.677	-0.787	2.641	3.692 (0.158)	34
D(LQ45)	-9.553	51.915	-1.345	5.463	18.293 (0.000)	33
Inflation	0.199	0.237	0.289	2.521	0.798 (0.671)	34
D(Inflation)	-0.017	0.245	0.053	2.105	1.117 (0.572)	33
Exchange rate (ER)	14356.62	548.458	1.445	6.583	30.023 (0.000)	34
D(ER)	38.697	523.786	1.418	9.723	73.217 (0.000)	33

Note:

- Normal Distribution = Skewness \pm 0.80; Kurtosis \pm 3.00
- JB = Jarque-Bera = $\frac{n}{6} (S^2 * \frac{(K-3)^2}{4})$

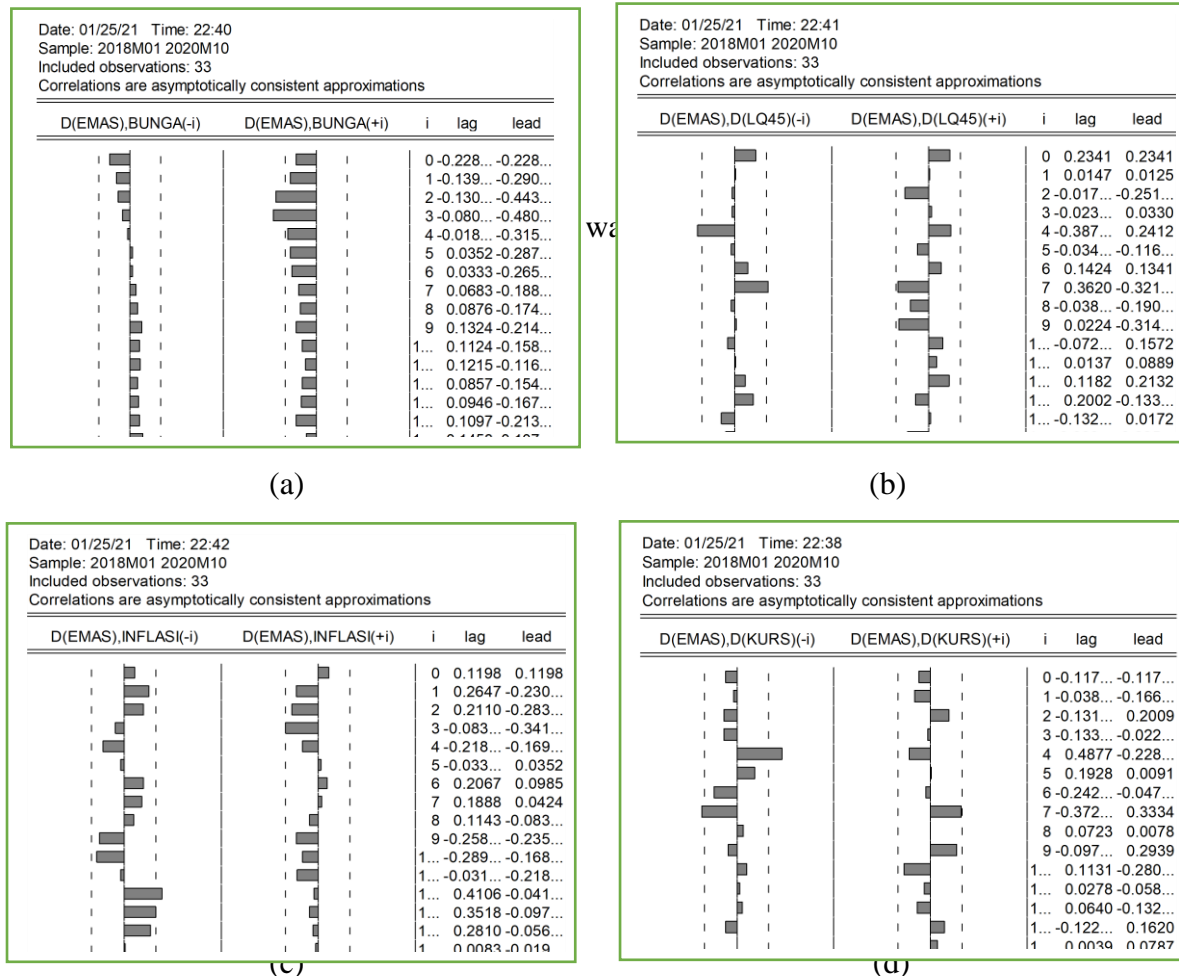
Source: own research

Changes in variables, such as D(Gold), D(LQ45) and D(Exchange rate) show the distribution abnormality. The interpretation that can be pinned on this condition is the assumption that the three variables, the movement of which describes the speculative attitude of the holder. Between the minimum value of change, Dmin, and the maximum value of change, Dmax, there is a high deviation. When deviations occur in the change data, it can be interpreted as a speculative trait.

Cross-correlation analysis. Cross-correlation analysis is used to determine the correlation between two variables by considering the movement for a certain range. In this case, the time range used is 16 lags following the default program. From the calculation results can be described:

Cross-correlation d(Gold) ↔ Interest. The interest variable is considered as a representation of the movement of the real sector. If the owner of the asset will place his asset with two alternatives. The first alternative, assets are placed in a form that is able to provide profits, or diversifier investment. The second alternative, assets are placed in haven positions when profits cannot be achieved. The interest variable describes the investment situation in the real sector. Decisions about interest rates must be based on the market. The higher interest rates can be caused by a high demand for credit. Because the real sector promises big profits, the demand for credit will increase which will result in an increase in credit prices (interest rate).

Figure 2. Cross correlation and correlogram (Notes: EMAS = GOLD; BUNGA = INTEREST; INFLASI = INFLATION; KURS = EXCHANGE RATE



Source: Own research

From the correlation results, in general, it was noted that $r(d(\text{gold}), \text{interest}) = -0.229$ (prob.=0.20). This means that there is a tendency for the gold-interest relationship as a haven or hedge. These results are supported by cross-correlation results: Lag-0 to lag-4 $r(d(\text{gold}), \text{interest}) < 0$ and lag-5 to lag-16 $r(d(\text{gold}), \text{interest}) > 0$, with correlation which tends not to be statistically significant, it is more directed to safe haven.

These results are supported by Flavin et.al. (2014) and Baur and Lucey (2016), that gold has a tendency as a safety asset when the economy is in a turmoil situation.

Cross-correlation $d(\text{Gold}) \leftrightarrow d(\text{LQ45})$. The LQ45 variable represents asset development efforts through the capital market. From the correlation results, in general, it was noted that $r(d(\text{gold}), d(\text{LQ45})) = 0.234$ (prob.=0.19). This means that there is a tendency for gold-LQ45 to be a safe haven. From the results of cross-correlation: lag-0 to lag-2 $r(d(\text{gold}), \text{LQ45}) > 0$ and lag-3 to lag-5 $r(d(\text{gold}), \text{LQ45}) < 0$. With a correlation that tends not statistically significant, the gold-LQ45 relationship is more towards safe havens.

This finding is different from Robiyanto (2018) who relates it to bonds, that gold is an investment tool because bonds themselves have dual benefits, firstly as an investment tool, secondly, corporate bonds and government bonds, have a tendency to always follow the

movement of the driving factors, such as interest rates. or the exchange rate, so bondholders do not need to place gold as a safe haven. Gold will be used as a diversifier investment.

Cross-correlation d(Gold) ↔ Inflation. From the correlation results, in general, it is recorded that $r(d(\text{gold}), \text{inflation}) = 0.119$ (prob.=0.51) meaning, there is a tendency for the gold-inflation relationship to move positively towards inflation, which indicates that gold can be relied on as a wealth guard. From the results of cross-correlation: lag-0 to lag-2 $r(d(\text{gold}), \text{inflation}) > 0$; lag-3 to lag-5 $r(d(\text{gold}), \text{inflation}) < 0$ and the next lag tends to be positive; $r(d(\text{gold}), \text{inflation}) > 0$. This confirms that gold is a safety tool against a decline in the value of money with a relative increase in the general price level.

Cross-correlation d(Gold) ↔ d(Exchange Rate). From the correlation results, in general, it was noted that $r(d(\text{gold}), d(\text{Exchange})) = -0.117$ (prob.=0.52). This shows that the gold-exchange relationship tends to be a safe haven. From the results of cross-correlation: lag-0 to lag-3 $r(d(\text{gold}), \text{exchange rate}) < 0$ and lag-4 to lag-5 $r(d(\text{gold}), \text{exchange rate}) > 0$, with a correlation that tends to not statistically significant, so it is more directed to a haven.

This is in line with the research results of Shakil, et.al. (2018) which shows that gold is a good safety tool for fluctuations in the IDR/USD exchange rate.

Forecasting. This forecasting stage considers the optimum lag which is calculated based on the Vector Auto Regressive (VAR) analysis. The results of the lag measurement that will provide the optimum lag are as follows:

Table 3. Optimum lag

	LR	FPE	AIC	SC	HQ
Gold (Lag-1)	78.72638*	3203.547*	10.90965*	11.00480*	10.93874*
Interest (Lag-1)	94.23430*	0.006874	-2.142399	-2.047241*	-2.113308*
LQ45 (Lag-1)	39.34905*	2995.821*	10.84261*	10.93776*	10.87170*
Inflation (lag-3)	2.146826	0.038417*	-0.42333*	-0.233019	-0.365153*
Exchange Rate (lag-1)	5.393336*	252117.4*	15.27528*	15.37044*	15.30437*

* Indicates lag order selected by the criterion

Source: own research

The next stage is to choose the most accurate forecasting method, based on the least square method. The choice is between the dynamic method and the static method, the choice of which is determined by two main indicators, namely: Root Mean Square Error (RMSE) and Theil's Inequality Coefficient (TIC). The calculation results are as follows:

Table 4. Forecast evaluation

EVALUATION	GOLD		INTEREST		LQ45		INFLATION		EXCHANGE RATE	
	DF	SF	DF	SF	DF	SF	DF	SF	DF	SF
RMSE	206.059	51.019	0.251	0.074	97.007	49.250	0.237	0.175	496.156	441.755
TIC	0.065	0.017	0.013	0.004	0.053	0.026	0.481	0.324	0.017	0.015

Source: own research

With the evaluation results, the forecasting model is based on the selected equation, namely:

Model-1: $Gold_t = -20.159 + 1.025 Gold_{t-1} ; R^2 = 0.95$

Model-2: $Interest_t = -0.487 + 1.044 Interest_{t-1} ; R^2 = 0.97$

Model-3: $LQ45_t = 109.253 + 0.873 LQ45_{t-1}; R^2 = 0.78$

Model-4: $Inflation_t = 0.189 + 0.587 Inflation_{t-1} - 0.292 Inflation_{t-2} - 0.258 Inflation_{t-3}; R^2 = 0.48$

Model-5: $Exchange Rate_t = 7043.861 + 0.512 Exchange Rate; R^2 = 0.78$

Forecasting of several price variables analyzed is carried out for the purpose of seeing in the next year, how the nature of the movement of gold price expectations on the other four variables. The correlation that occurs between the gold expectation variable and other expectation variables is as follows:

Correlation (goldsf-interestsf) = -0.99; Correlation (Goldsf-inflationsf) = -0.44; Correlation (Goldsf-Exchange ratesf) = -0.69; Correlation (Goldsf-LQ45sf) = 0.96. The correlation value indicates that the relationship between the gold price-interest and gold-exchange rate in the future is a strong complementarity, while the relationship between the gold price and the LQ45 variable is a very strong substitution or diversification.

4. Conclusion

The results of the cross-correlation calculation between gold and investment credit interest rates, the LQ 45 index, inflation and exchange rates have a low correlation in that period (2018-2020). This means that gold is more of a safe haven than an investment diversifier, meaning that gold is an asset that is able to maintain the value it contains, not easy to depreciate.

For gold price expectations for the next year, based on the correlation results, it shows that the relationship between gold prices - interest rates and gold prices - exchange rates is strong complementary, while the relationship between gold prices and the LQ45 variable is very strong substitution or diversification.

For now, use gold as a haven. For the next year, gold assets can be replaced with investments in the real sector or can replace gold with deposits in the form of US\$ currency or short-term securities.

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