

Linear Trend Regression Analysis on Gold forecasting for Investment in Indonesia During the Covid-19 Pandemic

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ABSTRACT

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Linear trend regression, also known as straight line trend, is a form of a linear trend, that is, a trend whose variable X is (Time Period) highest rank one. The purpose of this study is to look at the model and predict the number of gold prices during the COVID-19 pandemic in Indonesia using the linear trend regression method. The results obtained for the model of the total price of gold during the COVID-19 pandemic in Indonesia are $Y = 623584.1 + 6129.1X$. As for forecasting the number of gold prices for investment during the COVID-19 pandemic in Indonesia for the next six months using the linear trend regression method, it increases every month; it can be concluded that gold is suitable for investment because the price tends to rise, especially during the Covid-19 pandemic in Indonesia.

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1. Introduction

The upper middle class generally ingests part of their income periodically to be used for the future. Therefore, in this case, a judgment is required to be made against the asset or income. The first option is not to spend money; the second is what to do about the money you have. Then the third verdict on how to make the amount of money can increase over time both in short and in the long term [1]. One way that must be done with the money or income is to invest in gold. This is because gold can be used as a financial standard among the people of Indonesia as well as other countries and is also a relatively enduring instrument and is accepted in all countries in the world. The use of gold in the monetary and financial fields is based on the absolute monetary value of gold itself against various currencies around the world, although officially on the world commodity exchanges, the price of gold is listed in the US dollar currency. The form of gold used in the monetary field is usually in the form of gold bars and various units of weight from grams to kilograms [2].

Gold is also one of the most stable principals (investment) Storage instruments. In addition, gold is called the oldest and most effective dimension of wealth. Since gold is superior to other metals and is trended more frequently in the financial system, prices, as well as the relationship of various financial variables, are often monitored by economic units [3]. Gold investment is one of the safe investments during the Covid-19 pandemic. The precious metal is widely chosen because the majority of people are familiar with gold and young reach. In addition, because the price of gold tends to be stable and rarely experiences a decrease in price, it is precisely at this time that it has experienced an increase in price in a short period of time. Gold investment is also easier to disburse so that it can meet urgent needs. As a result of the Coronavirus Disease-2019 pandemic, all people

are experiencing difficult finances. All eyes of the world are on gold investment, which has an exchange rate that will remain stable in the long term. During the Covid-19 pandemic, the value of gold prices is now increasing due to the weakening global economy, which is not in good condition. This is because many countries have allocated their funds for the purposes of handling Covid-19. In addition, several countries have implemented restrictive policies and even lockdown policies. Due to unfavorable global economic conditions, investors are trying to find protection in their investments. As a result, the demand for gold tends to increase during the Covid-19 pandemic.

One way to find out the picture of gold prices in Indonesia so that they are interested in investing in these precious metals is to forecast using the Linear Trend Regression method. There have been many studies on gold prices, including the influence of gold prices on profit achievement with the Simple Linear Regression method [4], in his research using one independent variable (X) with the dependent variable (Y). The research on the gold price identified a significant influence on the achievement of profits and large revenues sourced from the gold price, which can be seen from the effect of the gold price on the achievement of profits. This means that the price variable (X) partially has a very strong influence on the achievement of profits. This is due to the increasing demand for gold at PT. Pawnshop. The factors that greatly affect the achievement of profits at PT. Pegadaian, namely, the need to pay attention to price activities that will be carried out so that consumers and prospective consumers/buyers know and understand the ups and downs of gold prices in PT. Pawnshops so as to increase the achievement of future profits. Thus, forecasting can be said to be a calculation that has a strong and more definite basis so that the results are expected to be better than just guessing without using a clear method. In this study, researchers used the linear trend forecasting method. This method is a forecasting method using time series data in accordance with trend projections and seasonal variations in past gold price data that will be used in forecasting gold prices in Indonesia.

Based on the description above, the authors are interested in knowing the level of gold price value for investment in Indonesia during the Covid-19 pandemic using the linear trend regression analysis method.

2. Method

2.1. Research Locations

The location and placement of this research are at the Applied Statistics Laboratory, Statistics Study Program, Department of Mathematics, Faculty of Mathematics and Natural Sciences, Tadulako University.

2.2. Data

The data used in this study is Time Series data obtained from the CEICDATA.COM website, which will later be carried out with a linear trend model and produce forecasts on MAPE using Software R by the researcher,

2.3 Analysis Method

1. Perform data retrieval. Data collection, which in this case is taken through the Ceicdata.com website
2. Creating descriptive statistics
3. Creating an initial plot is required to be able to see the data plot graphically
4. Estimating a linear trend model

5. Calculating the coefficient of determination
6. Forecasting the linear trend method
7. Evaluate forecasting errors (errors) using Mean Absolute Percentage Error (MAPE).
8. Draw conclusions and make interpretations of the results obtained.

3. Results and Discussion

3.1 Descriptive Statistics

Descriptive statistics are carried out to describe or give a general picture of the total gold price in Indonesia. Table 4.1 is the result of a descriptive analysis of gold prices from January 2016-November 2020.

Table 4.1 Descriptive Statistical Analysis Results

Data Type	Average	Standard Deviation	Minimum	Maximum	Amount of data
Gold Price per Month 2016-2020	623584.1	133997,322	416000	902636	67

Based on Table 4.1, there is a trend pattern in gold price data in Indonesia which tends to increase or increase from February 2020 to August 2020 and increases rapidly in September 2020; this indicates that gold prices in Indonesia have increased during the COVID-19 pandemic. It can be said that the emergence of covid-19 caused the price of gold to increase; during the pandemic, it tends to be high and remains stable with high prices at the end of July 2021.

3.2. Initial Data Plot

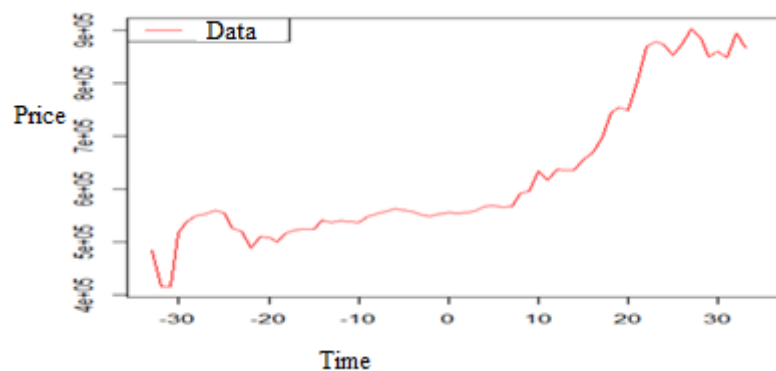


Figure 4.2 Time Series Pattern of Gold Price Data

Based on Figure 4.2, there is a trend pattern in gold price data in Indonesia during the covid-19 pandemic, which tends to increase or increase from February 2020 to August 2020 and rapidly in September 2020. This indicates that Indonesia is experiencing an increase in the number of gold prices. The trend of increasing gold prices due to the emergence of the COVID-19 pandemic has made sales of gold prices in Indonesia tend to increase rapidly. So it shows that gold is worth investing in. It can also be seen that the pattern of gold price data during the COVID-19 pandemic in

Indonesia is in the form of an upward linear trend. Thus, linear trend regression analysis is feasible to use in this study.

3.3. Linear Trend Model

This stage is the parameter estimation stage for the linear trend regression model using the least square method so that it will form a linear trend equation that can be seen in equation (2.1.6), where the model that has been obtained is used to forecast gold prices for investment in Indonesia due to the covid-19 pandemic for the next six month period.

3.3.1 Estimation of Model Parameters

Table 4.1 Parameter Estimation of Linear Trend Regression Model

No.	Parameter	Score	P-value
1	A	623584.1	0.000
2	B	6129.1	0.000

Parameter Estimation is a test used to see whether the model in linear trend regression with variable X affects variable Y or not. In this study, the test used is a linear trend model test. The hypotheses are as follows:

$$Y = 623584.1 + 6129.1X$$

Hypothesis:

H_0 : Gold price is affected by time period

H_1 : Gold price is not affected by time period

Based on the output obtained, it can be seen that the value shows a p-value (0.000) < (0.05) that the X variable, namely time, affects the Y variable, namely the price of gold during the covid-19 pandemic.

3.3.2 Coefficient of Determination

It can be seen that the R-square value obtained is 0.78 or equal to 78%. It can be seen that the coefficient of determination for the price of gold in Indonesia is 78%, while the rest is influenced by the time variable. By looking at the R-Square interpretation, which means that the X and Y variables have a strong relationship, this value indicates that the model is feasible to use for forecasting gold prices for investment during the COVID-19 pandemic in Indonesia.

4. Forecasting Total Gold Price

It is known that the model obtained in the form of a linear trend regression model is as follows:

$$Y = 623584,1 + 6129,1X$$

Then the table of forecasting prediction results to predict gold prices from December 2020 to

May 2021 from the data model in December 2020 is as follows:

$$Y = a + bx$$

$$Y_{(68)} = 623584,1 + 6129,1 (68)$$

$$Y_{(68)} = 831973,5$$

Based on the results of the above calculations, the results of forecasting gold prices in Indonesia in December 2020 were 831973.5. To see the results of forecasting gold prices in Indonesia for the next six months from December 2020 to May 2021 in full. (Y_{68})

Then the table of forecasting prediction results to predict gold prices from December 2020 to May 2021 from the data model in January 2020 is as follows:

$$Y = a + bx$$
$$Y_{(69)} = 623584,1 + 6129,1 \text{ (69)}$$
$$Y_{(69)} = 838102,6$$

Based on the results of the calculations above, the results of forecasting gold prices in Indonesia in January 2021 are 838102.6. To see the results of forecasting gold prices in Indonesia for the next six months from December 2020 to May 2021 in full. (Y_{69})

Then the table of forecasting prediction results to predict gold prices from December 2020 to May 2021 from the data model in February 2021 is as follows:

$$Y = a + bx$$
$$Y_{(70)} = 623584,1 + 6129,1 \text{ (70)}$$
$$Y_{(70)} = 844231,7$$

Based on the results of the calculations above, the results of forecasting gold prices in Indonesia in February 2021 were 844231.7. To see the results of forecasting gold prices in Indonesia for the next six months from December 2020 to May 2021 in full. (Y_{70})

Then the table of forecasting prediction results to predict gold prices from December 2020 to May 2020 from the data model in March 2021 is as follows:

$$Y = a + bx$$
$$Y_{(71)} = 623584,1 + 6129,1 \text{ (71)}$$
$$Y_{(71)} = 850360,8$$

Based on the results of the above calculations, the results of forecasting gold prices in Indonesia in March 2021 are 850360.8. To see the results of forecasting gold prices in Indonesia for the next six months from December 2020 to May 2021 in full. (Y_{71})

Then the table of forecasting prediction results to predict gold prices from December 2020 to May 2020 from the data model in April 2021 is as follows:

$$Y = a + bx$$
$$Y_{(72)} = 623584,1 + 6129,1 \text{ (72)}$$
$$Y_{(72)} = 856489,9$$

Based on the results of the above calculations, the results of forecasting gold prices in Indonesia in April 2021 are 856489.9. To see the results of forecasting gold prices in Indonesia for the next six months, from December 2020 to May 2021, in full. (Y_{72})

Then the table of forecasting prediction results to predict gold prices from December 2020 to May 2021 from the data model in May 2021 is as follows:

$$Y = a + bx$$

$$Y_{(73)} = 623584,1 + 6129,1 (73)$$

$$Y_{(73)} = 862619$$

Based on the results of the calculations above, the results of forecasting gold prices in Indonesia in May 2021 are 862619. To see the results of forecasting gold prices in Indonesia for the next six months from December 2020 to May 2021 in full. (Y_{73})

Based on the linear trend model obtained, it is then possible to use the forecast values for the total gold price data in Indonesia in this study for the next six months [7]. The following are the results of the forecast data for the gold prices in Indonesia, which can be seen in Table 4.3.

Table 4.3 Results of Forecasting data on the number of gold prices for investment in Indonesia during the Covid-19 pandemic

No	Month	Year	Forecasting Value
1	December	2020	831973.5
2	January	2021	838102.6
3	February	2021	844231.7
4	March	2021	850360.8
5	April	2021	856489.9
6	May	2021	862619

The predicted value of the total gold price is estimated based on each point of observation so that each point has a different prediction result. Prediction results on the linear trend model can be seen in (Figure 4.4). In summary, the linear trend model obtained is as follows:

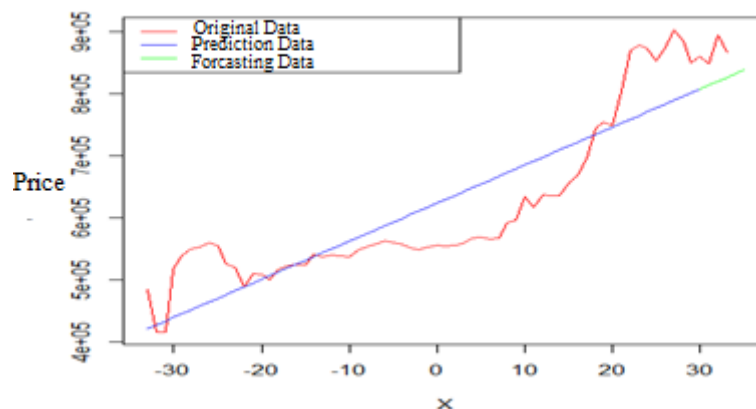


Figure 4.4 Plot of Predicted Results of the Total Gold Price in Covid-19

Based on table 4.4, the results of forecasting the number of gold prices in Indonesia for January 2016-November 2020 have an upward trend from day to day, which can be seen in Figure 4.4, which is symbolized by the blue line. Looking at the forecasting results that have increased from day to day, it can be concluded that gold is suitable for investment because the price tends to rise, especially during the covid-19 pandemic in Indonesia.

5. Evaluating Errors Using MAPE

Mean Absolute Percentage Error (MAPE) is a measure of relative error because MAPE expresses the percentage of error in the estimation or forecasting results against the actual results during a certain period which will provide information on the percentage of error that is too high or too low. In other words, MAPE is the average absolute error over a certain period which is then multiplied by 100% to get a percentage result. MAPE is also a measure of relative accuracy used to determine the percentage deviation of the estimation results. This approach is useful when the size or magnitude of the forecast variable is important in evaluating the accuracy of the forecast. MAPE can identify how big the error in guessing is compared to the real value [6,8, 9].

Based on (equation 2.1.7), the MAPE value in the prediction of the total gold price of 0.084, which is in the range below 10%, is very good by looking at the MAPE value criteria in Table 2.2, which means the prediction is very good. This value identifies that the estimated linear trend regression model obtained provides excellent predictive results in predicting the number of gold prices during the COVID-19 pandemic in Indonesia. So that the linear trend regression model obtained can be used to forecast the next period.

Conclusion

Based on the results and discussions that have been carried out previously, the following conclusions are obtained:

1. The linear trend model for the number of gold prices during the COVID-19 pandemic in Indonesia uses a linear trend regression as follows:

$$Y = 623584,1 + 6129,1X$$

The R-Square value obtained is 0.78 or equal to 78%. It can be seen that the coefficient of determination for the price of gold in Indonesia is 78%, while the rest is influenced by other variables outside the equation. By looking at the R-Square interpretation in (Table 3.1) which means that the X and Y variables have a strong relationship, this value indicates that the model is suitable for forecasting gold prices during the COVID-19 pandemic in Indonesia.

2. Based on the data, the results of forecasting the number of gold prices in Indonesia during the COVID-19 pandemic for the next six-month period using the linear trend regression

method have a tendency to increase every month. Seeing the forecasting results, which increase every month, it can be concluded that gold is suitable for investment because the price tends to rise, especially during the COVID-19 pandemic in Indonesia.

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