



FORECASTING EXCHANGE RATE WITH AR(1) AND MA(1)

*Armi Bakar*

*Lecture at Universitas Indraprasta PGRI,  
Jakarta, indonesia*

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*Abstract*

*In this study has a major problem with the B & J methodology, the problem is related to the inaccuracy of the identification stage of MA and AR model. The process of autocorrelation and partial autocorrelation of the actual data is very difficult to interpret accurately, the overall data rhythm model for the stages procedures that are often fewer than expected. The study therefore has further problems regarding the diagnostic check stage, which will only show when the proposed model is "too small" and will not tell when the proposed model is "too big". This study uses variable data of rupiah exchange rate against US dollar during period of December 1984 - December 2017.*

*Keywords: Exchange rate, Moving Average, Autoregression, Forecasting*

**I. PRELIMINARY**

On Monday, July 9, 2018 the rupiah exchange rate moved up 47 points. The rupiah value is projected at Rp 14,328, compared to the previous position of Rp 14,375 per US dollar. . There is an opinion that explains the rising unemployment claims coupled with high unemployment and rising inflation. As well as the growth of the salary figure below the previous forecast, it is expected to be a balancing factor to defend the rupiah in its green zone, "The rupiah is still in an unstable position, which is expected to move in the range of Rp14,378 to Rp14,359 US dollars. Previously, at the end of last week, the rupiah was able to move positively, even surpassing the resistance target of Rp14,395 to Rp14,365-Rp14,363 per US dollar despite accompanying market fears about the impact of trade war which could increase demand for safe currency haven ". On the other hand, a number of other currencies saw gains after market participants refrained against the US dollar ahead of the release of employment data.

In fact, contrary to domestic concerns, other currencies also strengthened against the Chinese yuan as fears of a trade war could hinder China's economic growth acceleration. As a result, the rupiah was in the spot currency market participated rose along with the weakening of the yuan and the dollar. In line with the rupiah, the Jakarta Composite Index (IDX) opened higher by 24.95 points or 0.44 percent to 5,719.86. While the group of 45 leading stocks or LQ45 moved up 6.31 points (0.7 percent) to 901.69.



## II. LITERATURE REVIEW

According to Musdholifah & Tony (2007), the exchange rate or exchange rate is the comparison between the price of a country's currency with the currency of another country. For example, the rupiah exchange rate against the US dollar shows how much rupiah is needed to be exchanged for one US dollar.

According to Triyono (2008), exchange rate (exchange rate) is the exchange between two different currencies, which is a comparison of the value or price between the two currencies.

### Exchange Rate Determination

The change in the demand and supply of a currency, which in turn causes a change in the exchange rate,

is caused by many factors as described below (Sukirno, 2004: 402).

- 1 Changes in the taste of society.
- 2 Changes in the prices of export and import goods. .
- 3 Increase in general prices (inflation).
- 4 Changes in interest rates and rate of return on investment.
- 5 Economic growth.

### Currency Exchange System

According to Triyono (2008) there are five main types of exchange rate systems: floating exchange rate, pegged exchange rate, crawling pegs, basket of currencies, fixed exchange rate.

#### 1 The floating exchange rate system

Exchange rate is determined by market mechanism with or without government intervention in stabilization effort through monetary policy if there is government interference then this system including managed floating exchange rate.

#### 2 The currency system is tethered

A country attaches the value of its currency to something or a group of currencies of another country which is a major trading partner country of the country in question, this means that the currency of the country moves to follow the currency of the country to which it moors.

#### 3 The exchange rate system is tied to a crawl

Where the state makes periodic changes to its currency in order to move toward a certain value within a certain time frame. The main advantage of this system is that the state can measure its exchange rate settlements over a longer period when compared with the exchange rate system.

#### 4 System of a basket of currencies

The advantage is that the system offers the stabilization of a country's currency because its currency movements are spread in a basket of currencies. The currency included in the basket is usually determined by the extent of its role in financing a particular country's trade.

#### 5 Fixed exchange rate system

Where a country establishes and declares a certain exchange rate on its currency and maintains the exchange rate by buying or selling foreign currency in an unlimited amount in that rate. For countries with high dependence on foreign sectors as well as such disruptions as natural disruptions, setting fixed exchange rates is a high risk policy.



**III. MATERIAL AND DISCUSSION RESEARCH**

This study was conducted by the authors in May 2018, using the data exchange rate of the rupiah against the US dollar union. This study uses the analysis of exchange rate forecasting data with the method of AR (1) and MA (1). For statistical analysis of time series, AR and MA models provide parsimonious descriptions of stationary stochastic processes which are considered to be slightly weak for 2 polynomials, 1 for AR and 2 for MA moving average. The general AR and MA models are described in 1951 Peter Whittle's thesis, hypothesis testing in time series analysis, and popularized in 1970's books by George E. P. Box and Gwilym Jenkins.

By looking at the time series model of  $X_t$  data, the AR and MA models can be used as tools for understanding and predicting future values in a series of data. For AR and MA models this is an autoregressive (AR) and moving average (MA) section. The AR section involves a variable regression on its own song (ie, before). The MA section involves modeling the term error as a linear combination of errors that occur simultaneously and at various times in the past. Here is the result of analysis by using model AR (1) and MA (1).

**Table 1 : Result for AR(1) regression model**

Dependent Variable: SERIES01				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	25586.32	62686.20	0.408165	0.6860
AR(1)	0.981107	0.058676	16.72084	0.0000
R-squared	0.900189	Mean dependent var		6144.671
Adjusted R-squared	0.896969	S.D. dependent var		4032.936
S.E. of regression	1294.509	Akaike info criterion		17.22834
Sum squared resid	51948325	Schwarz criterion		17.31904
Log likelihood	-282.2676	Hannan-Quinn criter.		17.25886
F-statistic	279.5866	Durbin-Watson stat		2.536834
Prob(F-statistic)				
0.000000				
Inverted AR Roots				
.98				

**Sourced: Proceed author by software**

As for the next model, the Moving Average (MA) is used to explain a phenomenon that an observation at time  $t$  is expressed as a linear combination of a number of random errors. The general form of moving average model of order  $q$  or more succinct is written MA model ( $q$ )

**Table 2 : Result for MA(1) regression model**

Dependent Variable: SERIES01				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6104.681	804.9944	7.583507	0.0000
MA(1)	0.711785	0.126303	5.635531	0.0000
R-squared	0.554487	Mean dependent var		5997.622
Adjusted R-squared	0.540565	S.D. dependent var		4062.869



S.E. of regression	2753.879	Akaike info criterion	18.73643
Sum squared resid	2.43E+08	Schwarz criterion	18.82622
Log likelihood	-316.5193	Hannan-Quinn criter.	18.76705
F-statistic	39.82733	Durbin-Watson stat	0.825580
Prob(F-statistic)			
0.000000			
Inverted MA Roots			
-.71			

Sourced: Proceed author by software

For a series that is modeled as its own weighted lag and the term random shock is also known as innovation. The usefulness of such specifications is that predictable sequences based on past and persistence in series can be modeled as AR processes are always correlated. A moving average process (MA) is where the time series is modeled as the sum of random shock (innovation). Since each of these innovations is distributed independently and means zero, the constant variance is independent of time; the process is silent. Very simply, the stationary process has an average constant and an independent variance of time. Each MA process (the weighted sum of innovations - each zero) is a stationary process. Therefore, MA is one way of modeling a stationary time series with a non-zero constant mean

#### IV. CONCLUSION

For the use of 2 models, the first model is AR (1), while the last one is MA (1), because the first model is random walk, it should be called ARIMA model (0,1,0), but still can be seen as case special autoregressive. But we know that the theoretical principle of the MA process (q) will be zero after passing through several q lags, thus making the acf nal of MA (1) will be 0 in all inactivity after 1. For the process of using the autoregressive model, the acf niali will die off gradually. It will die fast enough for case (2), with each successive autocorrelation coefficient taking the value equal to half of the previous lag. For the first case, however, acf will never die, and in theory will always take a value of one, whatever lag.

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