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PREDICTION OF THE UNEMPLOYMENT RATE IN MALAYSIA

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Abstract: *Unemployment is a global phenomenon which is considered as an issue around the world. Generally, voluntary unemployment happens when an individual leaves their current job in order to find another while involuntary unemployment occurs as an individual is dismissed from their job and needs to find a new one. The objective of this paper contains three consequent parts, which are to identify the significant factors that affect the unemployment rate in Malaysia. Besides that, it is to find the best models for forecasting the unemployment rate in Malaysia. Lastly, to forecast the future value of the unemployment rate in Malaysia using the best model. The scope of this study is surrounding entire Malaysia. The variables selected for the study are inflation rate, numbers of population and gross domestic product (GDP). In order to analyze the factors, the significance level is tested while forecasting the unemployment rate requires the ARIMA and Holt's exponential smoothing methods. The results of the regression analysis show that the significant factors of unemployment are the inflation rate and population. The optimal model to forecast the unemployment rate in Malaysia is ARIMA (2,1,2). The research proved that there was an increment in the unemployment rate in Malaysia. Implying that the value of the unemployment rate in Malaysia will slightly increase from the year 2017 until 2026 and it predicts the future value of the unemployment rate in Malaysia is stable and not considered as the critical problem within the next ten years.*

Keywords: *Unemployment Rate, Gross Domestic Product (GDP), Holt's Exponential Smoothing*

Introduction

In this era of globalization, unemployment has become an issue and a global phenomenon around the world. No matter how poor or wealthy that country might be, it will typically

experience an uncontrollable unemployment problem. According to Ruth, Emmanuel et al. (2014), unemployment is interpreted as a person at working age demand for a full-time job but he or she is unable to secure one. There are two major branches of unemployment which are voluntary and involuntary unemployment. Voluntary unemployment occurs when an individual left their current job in order to find another while involuntary unemployment occurs as an individual is dismissed from their job and needs to find a new one.

Unemployment is a general problem faced by all countries in the world today, whether the effect is critical or under control. The effect of unemployment could give various negative impacts on the government, community and towards individuals. If the community keeps growing, then the unemployment rate will grow too. The effect of inflation and GDP increasing in general price can be related to criminal activities. It is because the Malaysian community lost their power to financially support themselves for a living, thus leading to crimes such as theft and robbery within the community. Typically, poverty in a country relates to unemployment rates. Even though a nation might have a high level of economic development and low rates of poverty, it does not necessarily mean that it has a low unemployment rate. High unemployment rates indicate that there is a critical inefficiency in locating human resources. Unemployment among youth is a crucial policy subject for many countries. Youth nowadays confronts hesitance to have a satisfied transition in the labour market which may cause negative consequence on a person, communities, economies and societies. Other than that, youth that are unemployed are tend to benefit less to the progression of a country. In general, in order to observe whether a particular nation is doing a good job in achieving productive employment or not is by measuring the key element which is unemployment rate.

The resulting number of unemployed people divided by the total number of people in the civilian labour force is equal to the unemployment rate. Before applying the calculation to find the unemployment rate, the term unemployment itself must be well-defined. Unemployment occurs when an individual is seeking for a paying job but not able to get one in which children, retirees, full-time students, part time workers and people who are not interested to look for a job are not included. There are a few terms that need to be considered such as long-term unemployment that describes a person looking for a job within four weeks after, while discouraged unemployment describes people looking for a job within a year which is counted as unemployed yet they are still interested to get one.

Literature Review

Unemployment Factors

According to Toh (2017) unemployment is one of the major issues in Malaysia which is affected by sime major factors such as inflation, GDP and populationgrowth. According to Ibrahim and Mahyuddin (2017), the unemployment rate among youth has dramatically increased by 1.2% from an estimation of 9.5% to 10.7% which can be compared to the national unemployment rate which increased only by 0.2% from 2.9% to 3.1%, this result indicates that unemployment in Malaysia is mostly amoung youth. Pallis (2006) in his study mentioned that the responsiveness of unemployment and inflation depends on government policy. According to (Dong 2011), it was found that in year 2000, approximately in every one hour 22 criminal cases were recorded in all states in Malaysia. Many researchers think that the criminal offences are related with factors like irresponsible policemen, and also their limited equipment and weapons. Unfortunately, the situation remains the same after even the government provided expansions and technological advancement for police forces. It is due because the assumptions are not very correlated to each other since the crime cases are still increasing annually (Dong,

2011). There are various determinants that can cause changes in unemployment rates. It is important to discover the significant factors that influence the rate of unemployment. Inflation is known to generate a huge impact on unemployment rate. It might be a negative or positive relationship between the inflation and the rate of unemployment based on the model and environment according to (Dong 2011).

Asif (2013) studied that, the most significant variables that affect unemployment rate are GDP, inflation, population growth and exchange rates. All the variables had been tested in three different countries which are China, India and Pakistan. Awang (2018) stated that Malaysia faced slower growth rate in economy development due to openness policy made by the government for encouraging investments from outside. At the same time, in the year 1970 the world faced high increasing oil prices due to war occurrence between Israel and Egypt countries. However, in 1998 to 2008 and 2009 to 2014 Malaysia recorded a high growing rate in GDP. The author stated that the main reason after the effect of government strategy on early 1980 is when they provided extra subsidies in order to help lower income and reduce inflation through money supply. A study conducted by Folawewo and Adeboje (2017) shows a relationship between inflation and unemployment as dependent variables. There are only two favourable outcomes which is employed (favourable) or unemployed (unfavourable).

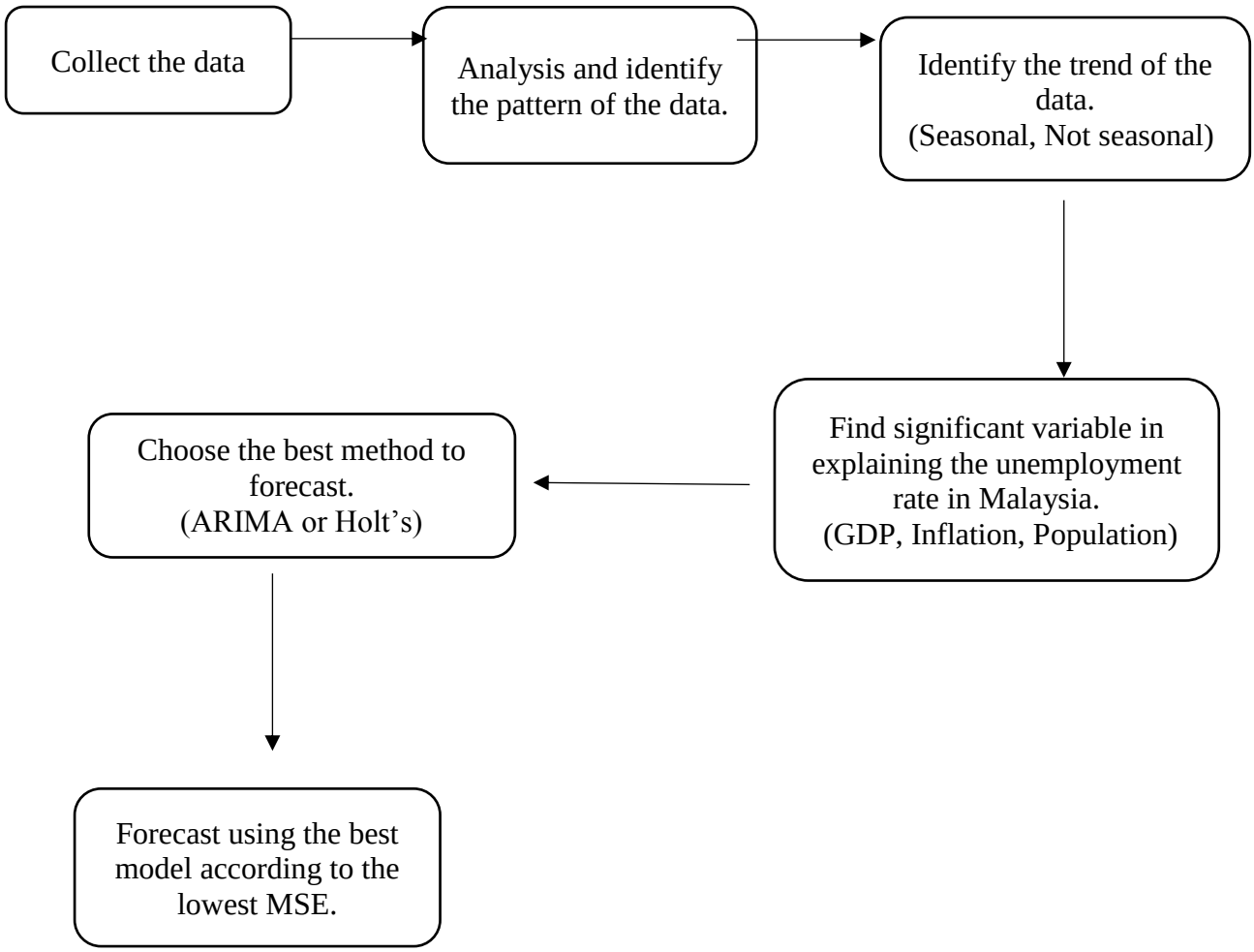
Forecasting the Unemployment Rate

Forecasting plays a major role in dealing with uncertainty of events that will happen to the future. It is rare for one to make an accurate forecast of future events such as climate changes for which it only can be finest presented in probabilistic expression (Hohle and Teigen 2015). According to Naccarato (2017), they used ARIMA as their forecasting model to forecast the unemployment rate in Italy. Referring to Nkwatoh (2012), ARIMA models blend together auto regressive (AR) models and the average(MA) which refer to the Box-Jenkins methodology. In order to predict trends of the future, ARIMA is suitable to be used for time series data. Meanwhile, the Holt's method is usually used to analyze the short-term prediction by studying the pattern. Holt's method with two variables are appropriate to predict five aspect labour force measure which are employed , unemployed, unemployment rate , underemployed and labour forces (Nasir, Hwa et al. 2008). In order to forecast the unemployment rate in Malaysia, exponential smoothing model will be used in this study, since exponential smoothing is sensitive to the change in data pattern (Dumičić et al. 2015). The research by Dumičić et al. (2015), they used Holt and Winters models in order to forecast the unemployment rate in European countries, since these models can handle the trend and seasonal component in unemployment rate. The other approach is derived from the connection between unemployment changes and output growth which is called Okun's law (Barnichon and Nekarda 2012).

Methodology

In this study we described the models and variables to be used in order to obtain unemployment rate in Malaysia. This methodology section includes the significant variables that affects the unemployment, data collection, sources of data and statistical techniques to be used to forecast the unemployment rate in Malaysia. Models that we used are Autoregressive Integrated Moving Average (ARIMA) and Holt's Exponential Smoothing (Holt's). We compared which one is the best model to forecast the unemployment rate in Malaysia.

Flow Chart



Data Collection and Variables

Data collection is the process of gathering and measuring information on target variables from an assortment of sources to get a relevant output. The data from this study consists of four main data which are Gross Domestic Product (GDP), Numbers of Population, Inflation Rate, and Unemployment Rate. For GDP, Numbers of Population and Inflation Rate we obtained from The World Bank website, the range of the data are from 1960 until 2016 and for the unemployment rate data in Malaysia from Department of Statistic from 1982 until 2016. Since the data for unemployment rate in Malaysia from 1982 until 2016 we decide to equalize the range of the year. It is collected, then used to forecast the future rate of unemployment in Malaysia for 10 years.

Significant Variables

The factors that we found, is then going to be the independent variable in order to determine most significant variables that give more impact on the unemployment rate in Malaysia via linear regression.

Future Value Unemployment Rate in Malaysia

To compare between two models as the forecasting models. The two models used are Auto Regressive Integrated Moving (ARIMA) and Double Exponential Smoothing (Holt's).

An Auto Regressive (AR (p)) is a model with p lags:

$$y_t = \mu + \sum_{i=1}^{\rho} \emptyset_t \ \emptyset_{t-1} + \ e_t$$

Where,

μ = a constant

$\emptyset_p$ = the coefficient for lagged variable in time t-p

A Moving Average (MA (q)) component presents the error term of the model for the possibility of a relationship between a variable and residuals from previous periods. MA (q) is a moving average model with q lags:

$$y_t = \mu + \sum_{i-1}^{q} \theta_i e_{t-1} + e_t$$

Where,

$\theta_q =$ the coefficient for the lagged error term in time $\mathrm{t} - \mathrm{q}$

In this study, the Holt's model is used in order to forecast the unemployment rate in Malaysia. The forecasting equation is constructed as below:

$$L_t = \alpha Y_t + (1 - \alpha)(L_{t-1} + b_{t-1})$$
$$b_t = \gamma(L_t - L_{t-1}) + (1 - \gamma)b_{t-1}$$

Thus, the general forecasting equation is:

$$F_{t+n} = L_t + nb_t$$

Where

t = Time

n = Step into the future

L_t = Smoothed permanent component

b_t = Smoothed trend component

α = Smoothing constant, $0 \leq \alpha \leq 2$

γ = Smoothing constant, $0 \leq \gamma \leq 1$

Y_t = Actual Data point at time t

b_{t-1} = Trend estimates from the previous period

Results and Analysis

Based on the testing, below are the results of multiple linear regression model.

Table 1: Coefficients Table for Multiple Linear Regression

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig
(Constant)	10.462	1.382		7.570	0.000
Inflation	-0.425	0.104	-0.488	-4.100	0.000
GDP	6.120E- 12	0.000	0.501	1.588	0.122
Population	-2.770E-7	0.000	-1.148	-3.601	0.001

At this point, in order to find the best model to forecast the value of the unemployment rate, the MSE values are compared between Autoregressive Integrated Moving Average (ARIMA) and Holt's Exponential Smoothing.

Table 2: Summary of Portmanteau Test

Statistic	Model							
	ARIMA (1,1,0)	**ARIMA (0,1,1)**	**ARIMA (1,1,1)**	**ARIMA (2,1,1)**	**ARIMA (0,1,2)**	**ARIMA (2,1,0)**	**ARIMA (1,1,2)**	**ARIMA (2,1,2)**
Calculated Q	4.5	6.7	4.5	4.7	4.9	4.6	7.2	5.4
DF	10	10	9	8	9	9	8	7
Tabulated Q	18.3	18.3	16.91	15.5	16.92	16.92	15.5	14.06
Decision	Accept Ho	Accept Ho	Accept Ho	Accept Ho	Accept Ho	Accept Ho	Accept Ho	Accept Ho
Conclusion	The errors are white noise	The errors are white noise	The errors are white noise	The errors are white noise	The errors are white noise	The errors are white noise	The errors are white noise	The errors are white noise
MSE	0.29561	0.30881	0.30443	0.31041	0.29499	0.30359	0.30713	0.26234

Table 3: MSE, MAE, and MAPE Value for Holt's Exponential Model

Model : Holts Exponential Smoothing
Selected smoothing Constant : (optimal ARIMA) α (level) = 1.31916 γ (trend) = 0.02372

Residuals	MSE	MAE	MAPE
	0.3344	0.4231	11.2677

Based on result on Table 3, it shows that the ARIMA method is better than Holt's exponential method. In order to forecast the unemployment rate for the next ten years, ARIMA (2,1,2) model is used.

It is discovered that the ARIMA (2,1,2) model is the best model to conduct forecast for unemployment rate since the value of MSE is low compared to Holt's. This model will then be used for the third objective, which is to forecast the unemployment rate from 2017 until 2026.

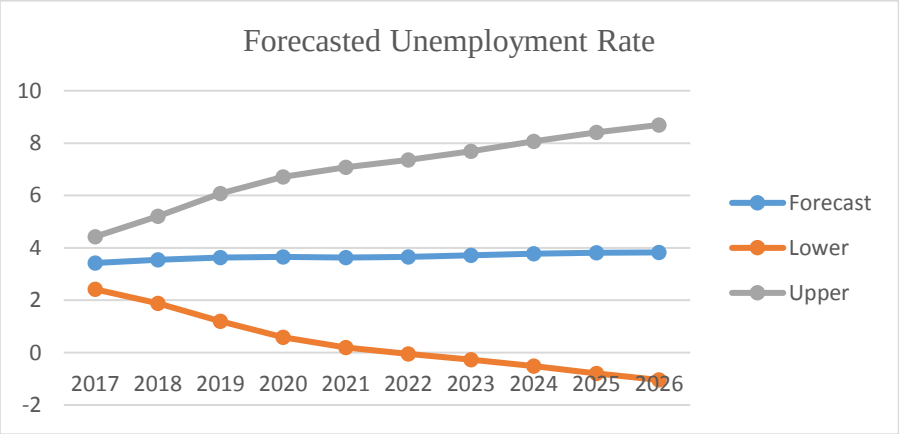


Figure 1: Graph for Forecasting, Upper and Lower Boundaries

Figure 1 shows the graph of forecasted unemployment rates. In year 2017, the forecasted unemployment rate is 3.42221%. The future unemployment rate slightly increases for ten years ahead. Then, the rest of the last 4 years started to increase at a minimum rate starting from year 2023 until 2026 at an average rate of 3.8 %.

Conclusion

Malaysia has a moderate increase in unemployment rate every year. The first objective conducted is to analyze the significant variable that affects the unemployment rate of Malaysia. Based on the findings, the common factors such as inflation rate and population growth in Malaysia significantly affect the unemployment rate. To summarize, graduated students should understand this situation and prepare for any uncertainty regarding this unemployment. The government also must take responsibility to make sure that the right actions need to be taken so that the unemployment rate is under control and does not affect other social and economic environment.

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