

Determinants of unemployment rate in the united states



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The rate of unemployment is one of the most important indicators of macroeconomic performance. Unemployment arises due to the distortions in the supply of labor caused by the non-competitive wage differential. During the period from 1945 until at least 1968, unemployment rates in the major European economies were extremely low by today's standards. For instance in the United Kingdom, the average rate of unemployment for the entire period was about 1.8% of the labor force and in worst years it did not even exceed 2.5%. The main driving force was autonomous rather than policy related. These forces include waves of new products and processes, spread of trade and development around the world. However the cause of unemployment problem in Europe in comparison to the United States was their labor market institutions while the United States is far more superior due to the flexibility of their labor market.

In this paper, determinants of unemployment in US are the concerns with economic growth as the main concern. Economic growth of a nation is the increase in a nation's real output that occurs over time. In general, growth and unemployment are closely related as unemployment affects the growth rate through the scale of operation of an economy. Besides that, FDI inflow and inflation are taken into account altogether to identify the relationship towards the unemployment rate.

1. 1 Background

As unemployment is one of the most important economic indicators, the unemployment rate provides useful information such as how the labor market works as well as the percentage of human capital that is not used in the production process, which is especially crucial towards policy makers.

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Consequently, it is important to analyze the factors that impact the unemployment rate regardless short or long term perspective.

The United States of America is a developed country which has one of the largest population and production in the world (Encyclopedia, 2010). As unemployment are explained by structural factors mainly by inflexible labor market. One may wonder the about the impact which economic growth, inflation and FDI have on the unemployment rate of the United States of America as the clutches of unemployment are hard to escape even for a develop country, especially for US which possesses by far the most flexible labor market. As a case study, the United States of America has been chosen as the research country. United States of America is reckoned to be particularly appropriate as United States of America labor market has proven by all accounts to be more dynamic in the sense of a higher level of job turnover, resulting in high vacancy levels at any point in time. Recently, unemployment rate in the United States of America has been found to be as high as 9.6% as of August 2010 compared to the 4.1% ten years ago (Bureau of Labor Statistics, 2010). In the mean time the real GDP growth in 2000 was at 4.14% when the unemployment rate was 4.1% while the real GDP growth in 2003 was at 2.49% when the unemployment rate was 5.8% (Bureau of Labor Statistics, 2010). From here, it can be seen that unemployment rate moves in the opposite direction of economic growth, yet there were different versions of results concluded by different previous researchers.

1. 2 Problem Statement

Unemployment has been a famous macroeconomic variable that researchers tend to use to study on but even with so many researches carried out, some of the results obtained are not consistent with one and another. For instance, the debates among Monetarist and Keynesian views of unemployment as well as the new contributions of Lucas's approach and new Keynesian Economics shows that there was no reason to account for growth in the unemployment model.

However, a significant innovation occurred with Pissarides'(1990) formulation of an unemployment theory in equilibrium. In many previous attempts, he formalize a unique framework to study the labor market dynamic perspective, providing useful tools to analyze both long and short run unemployment. Pissarides also introduced a first link between long run unemployment and growth which matches the neoclassical framework of economic growth. (Pissarides, 1990 Ch. II)

In the case of US, its economy began its current economic recovery in December 2001. However, rather than experiencing employment growth, not only did the unemployment rate increase but the number of new jobs created in the economy actually declined significantly during the first year of the recovery (Seyfried). Thus this paper is conducted so as to affirm the relationship of economic growth has on the unemployment rate of the country. As some results obtained by past researchers showed that economic growth impacts unemployment whereas the others came to a conclusion that unemployment causes economic growth whereby the existence of Granger Causality relationship is quite possible. In this study, <https://assignbuster.com/determinants-of-unemployment-rate-in-the-united-states/>

economic growth, inflation and FDI serves as explanatory variable to determine the relationship towards unemployment rate in the United States of America.

1. 3 Objectives

This study aims to investigate the determinants of unemployment rate in the United States of America with economic growth as the main concern in addition with inflation and FDI (foreign direct investment) to further assure that it is coherent with the results obtained from previous studies.

1. 3. 1 Specific objectives

This paper aims to examine the relationship between economic growth, inflation and FDI towards the unemployment rate. On the other hand, this paper serves to probe further into the relationship between economic growth, FDI, and inflation towards unemployment to sustain the existence of granger causality relationship.

1. 4 Significance of study

The contribution of carrying out this study is to allow policy makers to have an insight of unemployment so as to allow them to decide on suitable policy that will help bring down the unemployment rate while sustaining appropriate inflation level and attract sufficient FDI inflow. The results generated will help provide insight to the nature of the relationship between economic growth, inflation, and FDI towards unemployment. It would be useful to policy makers to know the rate and relationship of economic growth as it is necessary to reduce the unemployment rate, or at least keeping it from rising. Moreover, in previous studies, FDI is found to have impacted the

unemployment rate indirectly through spillover effects from economic growth. In this study, however, FDI is incorporated directly to affect unemployment growth; therefore the effectiveness of the implemented policy will be taken into account more effectively.

CHAPTER 2: Literature Review

2.1 Conceptual Model

According to Alexopolous (2003), in the case where there is technological growth in the economy, families will increase their investment in capital, which in turn increase the amount of family purchased consumption workers receive over time. As a result, firms optimally increase the wage rate proportionately in order to prevent workers from shirking on the job. Therefore, the rate of unemployment along the balanced growth path will not change over time, since the marginal product of labour and the marginal cost of labour grow at the same rate.

Based on De Groot, in general, growth and unemployment are intimately related for two reasons. Unemployment affects the scale of operation of the economy and thereby the growth rate. Growth affects inter-temporal decisions of workers about where to allocate on the labor market once they are laid off, and thereby it affects equilibrium unemployment.

According to Brecher (2007), rapid economic growth and FDI, accompanied by higher per capita income, usually increase output growth. Thus, domestic firms and foreign multinational corporations will demand more labour force with skills to create products. Hence, economic growth can promote future

employment growth for labour force based on new Keynesian theory of the output-inflation tradeoff.

Some studies found that overseas investment replaced domestic employment in developing countries; however, the same result did not happen in developed countries.

Tremblay (2007) pointed out that based on classical economic theory, the Phillips Curve illustrated long-run tradeoff between unemployment and inflation. There is an inverse relationship between inflation and unemployment, that is saying inflation will rise when unemployment decrease and vice-versa.

Futhermore, Luciano Fanti and Piero Manfredi (2003) mention that the neoclassical Solow model, which still provides excellent econometric fits and shows a globally stable positive growth equilibrium, but also shows two restrictive features as regards the scope of this paper: (1) it does not take into account the stylized fact of the existence of unemployment, which is generally not only positive but also strongly fluctuating; (2) in such a model fluctuations have never been endogenously determined

Meanwhile, Martin Zagler (2006) noticed that the cost associated with economic growth is structural unemployment, as structural change destroys jobs in one firm and creates jobs in another. The source of unemployment is the rate of intra-sector structural change associated with faster economic growth.

Besides, Bonatti (2007) says that an increase of the workers' influence on the political process may raise the fraction of GDP allocated to finance the welfare state, thus leading to a higher unemployment rate and to a lower growth rate.

The research work done by Chang (2007) noticed that when the degree of trade openness of Taiwan is larger, the unemployment rate of Taiwan will increase, this is because the young men and young women in Taiwan desire to extend their education in working age.

According to Phillips (1998), the negative relationship between inflation and unemployment can be explained through government's expansionary policy to increase the consumption level of the citizens. As labor market tightens, unemployment rate will fall as money wages tended to rise more rapidly. Unemployment will then increase as government tries to control the inflation rate. This is because the increment in wages is closely related with the increase in price. Therefore, the trade-off between these two variables can be seen.

2. 2 Methodology

Effects panel regression methods were used by Zagler (2006) on the relationship between economic growth and unemployment. Moreover, Zagler (2006) checked his estimated model with the unit-root test to test the stationary of the model.

In order to obtain information about the relationship between inflation and unemployment, the procedure of den Hann was employed by Bae (2006), which has the advantage as no assumptions about the order of integration in <https://assignbuster.com/determinants-of-unemployment-rate-in-the-united-states/>

the variables of interest is required. The procedure estimates a vector regressions (VAR) model and analyzes the correlations of VAR forecast errors of inflation and unemployment at long horizons.

Chang (2007) used vector autoregression method of variance decomposition and impulse response function analysis are applied to analyze various relationships among foreign direct investment (FDI), economic growth, unemployment and degree of openness in Taiwan. Besides that, he also uses the unit root test of augmented Dickey-Fuller (ADF and KPSS) test to examine the stationary properties of the economic time series. The appropriate lag-length in the ADF regression is selected by minimizing the Akaike's information criterion (AIC). He also uses co-integration test to determine whether there exists a long-run equilibrium relationship among variables and weak exogeneity, and multivariate Granger-causality test to determine their causal direction in the short-run between all variables. Besides, he also has applied the VAR technique of variance decomposition and impulse response function analysis to analyze various inter-relationships between FDI, unemployment rate and GDP variables in the case of Taiwan from the period of 1981 to 2003.

Meanwhile, Eric Heyer, Frédéric Reynès, Henri Sterdyniak (2006) present the results of the DF-GLS unit root test to test the growth rate of consumer price and also unemployment rate.

2. 3 Empirical Result

Zagler (2006) has carried out a research which empirically investigated the link between economic growth and unemployment, using micro econometric

evidence for the United Kingdom. The results generated showed a significant and negative relationship between unemployment and economic growth.

According to the result generated by Muscatelli and Tirelli (2001), it is proven that there is a negative relationship between economic growth and unemployment as Japan, Germany, Italy, France and Canada. This result is generally in favour of those theories which predict a negative linkage between unemployment on economic growth

Besides, Pehkonen (2000) stated that a fall in GDP has significant relationship with unemployment as a drop in the GDP in Finland leads to an increase in the unemployment since demand for labor have shrunk.

Therefore, Pehkonen (2000) concluded that unemployment would increase as a result of a decrease in economic growth.

Meanwhile, Mitra and Sato (2007) found that the major links between external scale economies and growth are perceived in terms of technical efficiency, and higher growth is taken to reduce the unemployment rate.

Furthermore, Sahaik and Groot (1998) found that the unemployment and economic growth relationship in imperfect competition economy and different periods, where structural changes occur, has a negative correlation and effect of different degrees through testing the structural stability.

Chang (2007) proved that economic growth as well as FDI have negative effects on unemployment as FDI are expected to generate economic growth by encouraging the expansion of trade and foreign investment. In addition, according to Solow's growth theory, employment for labour force with skill

can further promote economic growth and this can be verified by Taiwan's economy model. Okun's law stating that reducing unemployment for labour force can promote further economic growth is then verified. Furthermore, unemployment is very sensitive to changes in GDP and vice versa, which does lend support that rising economic growth can obviously affect unemployment for labour force. shock of unemployment rate has negative effect on economic growth . He also mentions that the shocks in economic growth and FDI inflow decrease the unemployment rate. This means that rapid economic growth and FDI inflow, accompanied by higher per capita income can promote future employment growth for labour force.

In the research study of Meckl (2001), correlation between growth and unemployment is shown to be positive if the research sector is of the high-wage sector in the economy, and negative if the research sector is the low-wage sector.

Arico (2003) has already observed that the rate of growth is negatively related with the rate of unemployment. If the growth rate increases, it will decrease the net rate at which the stream of profits is discounted. For each firm the entry will result less costly. More vacancies will be created, reducing the unemployment rate. (Capitalization effect). On the other hands, It will reduce the life-time of each firm, by increasing the price for human capital. Each innovation will generate fewer vacancies than before. That will be reflected in an increase of the rate of unemployment. (Indirect creative destruction effect).

Besides, Fanti and Manfredi (2003) has shown a negative relation between unemployment and growth , though we should also mention the positive relation between unemployment and growth obtained in the particular 'creative' disruption context according to Schumpeter's idea. Fanti and Manfredi alsomshows a surprising relation between unemployment and growth (via effects on population which is an endogenous engine of growth): this relation can be either positive or negative depending on the relative levels of cost of childrearing of workers and unemployed persons and the level of unemployment benefits.

Meanwhile, Bonatti (2007) noticed that reduction of government transfers in favor of the workers allows decreasing the ratio of total tax revenues to GDP, thus monotonically increasing the growth rate and leading to a lower unemployment rate.

CHAPTER 3: RESEARCH METHOD

3. 1 Data Analysis

3. 1. 1 Unemployment Rate

In this study, unemployment rate is the main study which was examine by using some explanatory variables. According to BLS, Bureau of Labor Statistics, (2009) those people who are with jobs can be considered as employed. On the other hand, a person will be classified as unemployed if they do not have a job, have actively looked for work in the prior 4 weeks, and are currently available for work. Dixon & Shepherd (2002) stated that the unemployment rate can be considered as one of the most important indicators of macroeconomic performance in a country.

The data of unemployment rate is obtained from the Bureau of Labor Statistics (BLS) which is measured in percentage from those people who are 16 years old and above from year 1970 to 2007. The method which BLS used to calculate the unemployment rate in United States is:

$\times 100\%$

3. 1. 2 Real Gross Domestic Product

Real gross domestic product (Real GDP) in a country can be measured by the total output value of goods and services which produced from the domestic labor in the country in a given year, expressed in base-year prices. In this study, it is expected that there is a negative relationship between the Real GDP and unemployment rate in United States. The source of the United States Real GDP data is from the World Bank World Development Indicators and International Financial Statistics of the IMF. On the other hand, the data obtained was converted to a 2005 base year. The formula to calculate the data of United States Real GDP is as below:

3. 1. 3 Foreign Direct Investment

Foreign direct investment (FDI) is a kind of investment which is made to serve the business interest of the investor in a company which is in a different nation distinct from the investor's country of origin. An example of FDI is a foreign company comes into a country to build or buy a factory and run a business there. Many economists believe that FDI is good for an economy, because it provides domestic job opportunities and increase domestic capital.

In this study, net inflows of foreign direct investment in the measurement of current US Dollar are used. A net inflow of foreign direct investment is the total amount or value of the investment flow into United States from foreign investors to operate their business in United States and negative relationship between foreign direct investment and unemployment rate is expected in United States.

3. 1. 4 Consumer Price Index

Consumer price index (CPI) is measured that examines the weighted average of prices of a basket of consumer goods and services in a country, such as transportation, food, rental fees and utilities fees. CPI is one of the measurements of inflation rate.

According to Bureau of Labor Statistics (BLS), the prices for the goods and services used to calculate the CPI are collected in 87 urban areas in United States from about 23, 000 retail and services establishments. The CPI data used in this study included all consumer items in United States from year 1970 to 2007.

3. 2 Research Framework

3. 2. 1 Unemployment rate and Real Gross Domestic Product

Based on the study, unemployment and real gross domestic product is expected to be negatively related. Edward (2007) stated there is a negative relationship between real gross domestic product and unemployment because of the theory of Okun's law. According to Okun's law, 1% increase in the unemployment rate will decrease GDP by 3%. However, Christopher (2010) said that, Okun coefficients can change over time because the

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relationship of unemployment to output growth depends on laws, technology, preferences, social customs, and demographics.

3. 2. 2 Unemployment and Consumer Price Index

Consumer price index is one of the most frequently used statistics for identifying periods of inflation or deflation. This is because large rises in CPI during a short period of time typically denote periods of inflation. Therefore, we expect that there is an inverse relationship between the rate of unemployment and rate of inflation. According to the Phillips Curve theory, if the unemployment is high, inflation tends to be low. The diagram below shows the Phillips curve.

Inflation

Phillips curve

Unemployment

However, the result shows a positive relationship in our regression model. This problem will occur because of the multicollinearity problem in our regression model. But when one independent variable by one independent variable with the unemployment is tested, negative sign for consumer price index and unemployment are obtained. Bae (2006) stated that there is a positive long run relationship between unemployment and inflation.

3. 2. 3 Unemployment and Foreign Direct Investment

In this study, inflow of foreign direct investment were expected to affect the unemployment rate significantly and expected that foreign direct investment

has a negative long run relationship with unemployment. Foreign direct investment will increase job opportunities so, unemployment rate will decrease. Shu (2007) stated that FDI have negative effects on unemployment as FDI are expected to generate economic growth by encouraging the expansion of trade and foreign investment.

3. 3 Econometric Methodology

3. 3. 1 Introduction

This chapter consist the used of the method to examining the relationship between the unemployment and economic condition in United State by using the time series data ranging from the year 1970 to 2007. First, the result testing will start with the test of stationary by using Augmented Dickey-Fuller unit root test and proceed with the cointegration test. Secondly, the Multiple Regression Analysis and several ways to detect the assumption of the Classical Linear Regression Model (CLRM). The multicollinearity is used to test the correlation analysis. Breusch-Godfrey Serial Correlation LM Test is used to test the existence of serial autocorrelation, Autoregression Conditional Heteroscedasticity Test is used for testing the heteroscedasticity variance of error of the model and Ramsey RESET Test is used to detect the linearity regression and misspecification error.

Unemployment = f (RGDP, FDI, CPI)

RGDP = Real Gross Domestic Product

FDI = Foreign Direct Investment

CPI = Consumer Price Index

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The change in unemployment is our main study that we want to examine with using a few of variables which are RGDP (Real Gross Domestic Product), FDI (Foreign Direct Investment) and CPI (Consumer Price Index).

$$y = \hat{\beta}_0 + \hat{\beta}_1 \ln(\text{RGDP}) + \hat{\beta}_2 (\text{CPI}) + \hat{\beta}_3 (\text{FDI}) +$$

Econometric Model with Expected Sign:

$$= \hat{\beta}_0 + \hat{\beta}_1 \ln(\text{RGDP}) + \hat{\beta}_2 (\text{CPI}) + \hat{\beta}_3 (\text{FDI})$$

(-ve) (-ve) (-ve)

Where +ve indicates that there is a positive relationship between the explanatory variable and dependent variable. On the other hand, -ve indicates that there is a negative relationship between the explanatory variable and dependent variable

3.3.2 Unit root

A unit root test is used to examine whether a time series variable is stationary. In the model, T-statistic, F-statistic and R-squared are used to determine to ensure the validity of the test statistics is stationary. The result will become spurious regression problem if the non-stationary series in the ordinary least square (OLS) regression is used. Spurious regression result in high significant T-statistic and highly value for the coefficient of determination R-squared, and the R-square is larger than Durbin Watson. Therefore, if the stationary does not hold, estimate is not consistent and result will be misleading. To avoid the spurious regression problem, the

Augmented Dickey-Fuller test (ADF) is used to examine the stationarity of the variable.

An Augmented Dickey-Fuller test (ADF) is used to test for a unit root in a time series sample. The Augmented Dickey-Fuller (ADF) statistic used in the test is a negative number. Therefore, the more negative value is, more power the rejection of the hypothesis that there is a unit root at some level of confidence.

The equation for Augmented Dickey-Fuller (ADF) test

Where $\hat{\alpha}$ is a constant, $\hat{\beta}$ is the coefficient on a time trend and p is the lag order of the autoregressive process. $\hat{\alpha} = 0$ and $\hat{\beta} = 0$ corresponds to modeling a random walk and $\hat{\beta} = 0$ corresponds to modeling a random walk drift. By including lags of the order p , the ADF formulation allows for higher-order autoregressive processes. This means that the lag length p needs to be determined when applying in the test. One possible approach is to test from high orders and examine the t-value on coefficients. The criterion such as the Akaike information criterion (AIC), Schwarz-Bayesian information criterion (SBIC) or the Hannan-Quinn information criterion (HQIC) test is used to examine the lag length.

3. 3. 3 Granger Causality

The Granger Causality test indicates that a time series Y is said to be Granger caused by X if X helps the prediction of Y or equivalently if the coefficients on the lagged X are statistically significant. Granger Causality shows two-way causation in the case. X Granger causes Y and Y Granger

causes X. It usually through a series of t-tests and F-tests on lagged values of X and lagged values of Y.

3.3.4 Multiple Regressions

The ordinary least squares (OLS) or linear least squares are a method to examine the unknown parameters in a linear regression model. It is used to assume the disturbance, u_i . According to Gujarati (2003), u_i stands for the normal distribution representing zero mean and constant variance, σ^2 in the multiple regression models. With the normality assumption, OLS estimators β_1 and β_2 are linear functions of u_i . Therefore, if u_i are normally distributed, so β_1 and β_2 will make hypothesis testing more straightforward. OLS estimators of the partial regression coefficients are identical with the maximum likelihood (ML) estimators. There are the best linear unbiased estimators (BLUE). Besides, the least-square estimators are best unbiased estimators (BUE); it means that they have minimum variance in the entire class of unbiased estimators.

3.3.5 Multicollinearity

Multicollinearity shows the two or more independent variables in a multiple regression model are highly linearly related. The multicollinearity test is perfect if the correlation between two independent variables is equal to 1 or -1. Multicollinearity will occur when there is a strong linear relationship among two or more independent variables.

The equation below is refer the variables is perfectly multicollinear if there exist one or more exact linear relationships among some of the variables.

Estimates for the parameters of the multiple regression equation is

The ordinary least squares estimates include inverting the matrix

$X'X$

where,

It indicates that if the linear relationship (perfect multicollinearity) is exactly with the independent variables, the rank of X is less than $k+1$ and the matrix $X'X$ will not be invertible.

One of the detection of multicollinearity is used detection-tolerance or the variance inflation factor (VIF) for multicollinearity

where R^2_j is the coefficient of determination of a regression of explanatory j on all the other explainers. Tolerances of less than 0.20 or 0.10 or a VIF of 5 or 10 and above reveal a multicollinearity problem.

3.3.6 Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM test is a test of autocorrelation that is basically allows for nonstochastic regressors such as the lagged values of the regressand; higher-order autoregressive schemes such as AR (1), AR (2), etc and higher-order moving averages of white noise error terms such as t .

Two variable regression models to illustrate the test, regressors can be added to the model and also lagged values of the regressand can be added to the model.

$$Y_t = \hat{\beta}_1 + \hat{\beta}_2 X_t + u_t$$

The error term u_t assume that the p th-order autoregressive, AR (p),

$$u_t = \rho_1 u_{t-1} + \rho_2 u_{t-2} + \dots + \rho_p u_{t-p} + \epsilon_t$$

where ϵ_t is a white noise error term.

The null hypothesis H_0 can be show as

$$H_0: \rho_1 = \rho_2 = \dots = \rho_p = 0 \text{ (no autocorrelation)}$$

At 5% significant level, if the computed p value of Chi-square is less than Chi-square tests, do not reject the null hypothesis, meaning that there is no autocorrelation problem. If computed p value of Chi-square is more than Chi-square tests, reject the null hypothesis, meaning that there is autocorrelation problem.

3.3.7 Autoregressive Conditional Heteroscedasticity Test

In econometrics, Autoregressive Conditional Heteroskedasticity (ARCH) model assume that the variance of the current error term is related to the previous one. Autoregressive Conditional Heteroskedasticity model is used to model the time series with time-varying volatility such as stock price.

3.3.8 Specification error

Ramsey Regression Equation Specification Error Test (Ramsey RESET test) is used to examine the specification error. The specification test for the linear regression model. More specifically, it is used to test the specification error in the equation. As the result, if the non-linear combinations of the independent variables have any power in explaining the dependent variable, means that the model is mis-specified.

Consider the model

$$\hat{y}_i = E \{y_i | \hat{x}_i\} = \hat{\beta}_0 + \hat{\beta}_1 \hat{x}_i$$

The Ramsey test is used to test whether the $(\hat{\beta}_1)^2, (\hat{\beta}_2)^3, \dots, (\hat{\beta}_{k-1})^k$ has any power in explaining y . The Ramsey test is executed by calculate the following linear regression

$$\hat{y}_i = \hat{\beta}_0 + \hat{\beta}_1 \hat{x}_i^2 + \dots + \hat{\beta}_{k-1} \hat{x}_i^k + \hat{\mu}_i$$

After examine the test, the means of the F-test is to determine whether $\hat{\beta}_1$ through $\hat{\beta}_{k-1}$ are zero. If the null hypothesis reveals that all regression coefficients are zero, means that the null hypothesis cannot be reject, the Ramsey test is unable to detect any misspecification. If the null hypothesis is rejected, means that the model is misspecification.

3.3.9 Jarque-Bera Test of Normality

Jarque-Bera test of normality is used to test the normally distributed. It is large-sample or an asymptotic test and based on the OLS. The test first calculates the skewness and kurtosis measures of the OLS residuals.

$$JB = n$$

Where the n = sample size, S = skewness coefficient, and K = kurtosis coefficient. The normally distributed variable, S is zero and K is three. Hence, the Jarque-Bera test of normality is a test of the joint hypothesis that S and K are zero and three, respectively. Therefore, the value of the Jaque-Bera statistic is expected to be zero.

For the null hypothesis the residual is normally distributed, asymptotically (i. e., in large samples) the Jarque-Bera statistic gives the chi-square distribution with two degree of freedom showed by Jarque and Bera (Gujarati 2003) For the alternative hypothesis the residual is not normally distributed. At 5 significant levels, computed p value is less than Jarque-Bera statistic, we can reject the null hypothesis that the residual is not normally distributed whereas computed p value is more than Jarque-Bera statistic, we do not reject the