

The Impact of Unemployment on Economic Growth in China

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ABSTRACT: *Economic growth which is considered as one of the best indicator of measuring the robustness of every economy is essential in understanding its relationship with unemployment which is an important macroeconomic indicator that reflects the incompetence of any economy to make full use of its human resources. Hence, a macro-economic secondary and time series data was extracted from the World Development Indicator (WDI) for the period of 1991-2018 in China. In conducting the econometric analysis of the study, both the Augmented Dickey-Fuller Test and Phillips Perron Test were employed to test and confirm the stationary level of the variables of study; the Autoregressive Distributed Lagged (ARDL) cointegration and the ARDL Bounds test were employed to test for the short-run and the long-run cointegration of the variables of study since both variable were stationary at first difference I (1). The finding of the study reveals that there are negative short-run and a longrun relationship between unemployment and economic growth. However, Granger causality Test also reveals that both unemployment and economic growth do not impact each other.*

1.1 Background of the Study

Unemployment is one of the crucial variables to consider in understanding the micro and macro dynamics of most economies and developing strategic plans to stabilizing the economies of most nations in order to enhance economic growth and development. Unemployment is considered as one the worst situation any human society can experience since it affects in different dimensions and directions (Al-Habees&Rumman, 2012).

According to Akutson, Messiah, &Dalhatu (2018), unemployment is a serious predicament confronted by most developed and developing nations which leads to economic and social issues. The economic issues of unemployment is denying the nation of tax revenue in the form of income tax, wastage of productive hours and many others while the social issues of unemployment had to do with depression, lack of self-respect, and other vices such as robbery, prostitution and many others (Adarkwa, Donkor, &Kyei, 2017). More so, Al-Habees&Rumman (2012) also stated that unemployment is a multidimensional phenomenon compassing

economic and social phenomenon which shows the disparity in economic activity and consequence on the social structure of societies as a social activity.

The nature of unemployment is dependent on the structures of the country and the category of which the country fall under whether it is developed, developing or undeveloped (Soylu, Çakmak, & Okur, 2017). Anghel, Anghelache, & Manole (2017) explain that unemployment as a macroeconomic indicator reveals the ineptitude of a country to utilise its abundant labour resources. This shows that there are many active people who are readily available, searching and capable of adding to productivity output but cannot get a job to do (Yilmaz, 2005). The International Labour Organisation (ILO) defines unemployment based on three (3) important conditions of which must be met simultaneously and these conditions are; not working, ready to get employed and searching for a job (ILO, 2019).

Husmanns, Mehran and Verma (1990, p. 97) postulated that unemployment encompass all individuals who meet the recommended age to engage in economic activities and meets the conditions of without work, that, individuals, are not self-employment or who are not engaged in any job that fetches them income; currently available for work, that is, individuals who are readily available to be engaged any income earning job or employment and; seeking work, that is, individuals who are making an effort to get income-earning job or employment.

The classical theory explains that unemployment is a short term demand and supply of which free market force will automatically deal with it and restore maximum occupation in the economy (Banda, Ngirande, & Hogwe, 2016). The Keynesian theory holds the view that unemployment is normally triggered by insufficiencies in total demand over specific periods within the labour market such that adequate jobs are created to accommodate people who want to work (Keynes, 1936). The Marxist theory also explains that unemployment is as a result of the capitalist system where the means of production are owned by the bourgeoisie and the proletariat are exploited thereof through alienation and that unemployment can be reduced by replacing the capitalism with the socialism (Gyang, Anzaku, & Iyakwari, 2018).

Economic growth is generally defined as a variation in a nation's Gross Domestic Product (GDP) which is analysed as various contributions made by the populace in consonance with national income or capital (Piketty, 2014). According to (Jhingan, 2003), economic growth is the procedure by which the real income per person of a nation rises over an extensive period of duration, which is determined through the rising in productivity output (goods and services manufactured) in a nation. Economic growth is considered as one of the utmost imperative fiscal tools for plummeting poverty as well as improving the eminence of life (DFID, 2008). Hence, production of much goods and improved services within continues time period serves as the basis of increasing prosperity and reducing the disparity of revenue delivery among people in a broader perspective (Ademola & Badiru, 2016). The Mercantilists stipulates that core objectives of economic activities of traders and the state and a rise in the gross domestic product are embedded in the accumulation of wealth (McDermott, 1999). Adam Smith also described economic growth as not accumulations of gold but rather from the activities of trade, where parties to the exchange of goods are satisfied with his or her benefit and that market generally regulate themselves without any restrictions which lead to natural equilibrium (Smith, 1776).

However, Al-Habees & Rumman (2012) apprised that fiscal or monetary policy objective of the most economic policy of most nations is to increase economic progress and also improve the quality of life of its publics. Gross Domestic Product (GDP) is one of the important component in calculating economic progress is in consonance with other components such as unemployment rates, public spending, inflation, local and foreign investment and balance of trade which in one way or the other have their own peculiar contribution to economic growth of developed, developing and underdeveloped nations (Boldeanu & Constantinescu, 2005).

The influence of unemployment on economic growth (Gross Domestic Product) has long been a pertinent question in most economies (Quy, 2016). Reducing unemployment and increasing economic growth of a country is one the essential macro-economic issues confronting most developed, developing and

underdeveloped nations in contemporary times. The robustness of every strong nation is measured by its economic growth with unemployment as one of the imperative macroeconomic variables which reveal the ability of a republic to make full use of its labour resources (Soylu, Çakmak, & Okur, 2017; Hobijn, 2010).

A lot of studies have shown the presence of contradictory findings on the relationship that exist among unemployment rate and economic progress rate. This makes it difficult to generalise the findings of such studies and also helps in making a prediction on other economies (Seth, John, & Dalhatu, 2018). Okun's law elucidates two essential empirical relationship between unemployment rate and economic progress rate: periodical variations in the rate of unemployment were linked to periodical variation in the rate of economic progress, and nonconformities in the rate of unemployment were also linked to nonconformities in the rate of economic progress from their apex level (Daly & Hobijn, 2010).

In limiting unemployment, economic growth as a key macro-economic indicator has been acknowledging as a significant variable that can help resolve the menace of unemployment (Al-Habees & Rumman, 2012). The contribution of higher economic growth rate to development of the nation and not to talk of unemployment cannot be undermined but however, it plays a vital role in every economic development. It is a means through which the issues of unemployment can be abridged to help reduce poverty in a country. Progress in the economy offers the podium for emerging businesspersons to be born and on the other hand, serves as a means through which unemployment can be absorbed through the creation of jobs.

The hypotheses below would be assessed in this study.

H0: There is no long-run co-integration of China's unemployment and economic growth.

H1: There is a long-run co-integration of China's unemployment and economic growth.

H0: There is no short-run co-integration of China's unemployment and economic growth

H1: There is a short-run co-integration of China's unemployment and economic growth

2.1 Literature Review

This section is keen on reviewing detailed literature which is pertinent to this study and as such, intended to bring out detailed account on the various perspectives and intuition on; trends in China's unemployment and economic growth, the concept of unemployment, various concepts on economic growth, and theoretical of Okun's theory and empirical reviews of other researchers.

2.1.1 Trends in China's Unemployment

The annual unemployment rate of China is within the range of 3.76% and 4.89% in 2007 and 1991 respectively. This shows that out of 100 people who are actively searching and willing to work to receive some income only 4 to 5 people are unable to secure employment. This really shows that

Unemployment rate in China which falls in the range of 3.76% to 4.89% is not high but moderate and it really shows how the economy of China is able to contain most of the available human capital or labour force. Although, there is some linear additional upsurge in the rate of unemployment from 2010 where the unemployment rate was 4.12% to the current year 2018 where the unemployment rate is 4.71%. However, it can be perceived that the linear increase in the unemployment rate in each year from 2010 to date is reasonable.

2.1.2 Trends in China's Economic growth

China within the last four decade, that is, 1979 to 2017 has transformed its economy from the state is a poor developing nation to a state of being one of the most power developed markets in the world. The average annual real productivity output of China has grown to an approximate of 10% which according to the World Bank makes them one the faster grown, expanded and sustained economy in the world. This change in transition has cause China to eradicate about 800 million persons out of poverty (Morrison, 2018). According to the annual time series data available at World Development Indicator, the annual economic growth (GPD) rate of China is within the range of 14.23% and 6.7% which represents the highest rate economic growth (GPD) and the lowest economic growth (GPD) rate respectively form 1991-2018. This shows that from 1991 to 2018, a variation in economic progress (GPD) rate is within the highest 14.23% and lowest at 6.7%.

Though the rate of economic growth (GPD) is changing, in 1992 China had experienced its highest increase in economic growth (GPD) rate with a change of 4.93%. This shows that there was a lot of labour output which led to an increase in production. Nonetheless, between 2003 and 2004 China experience its lowest change of economic growth (GPD) rate with a rate of 0.07%. Which indicate there was little output which led to constant or little addition to 2003 economic growth (GPD).

2.1.3 The concept of Unemployment

The phenomenon of unemployment has been expounded from diverse viewpoints in the economic literature. The International Labour Organisation (ILO) defines unemployment based on three (3) important conditions of which must be meet simultaneously and these conditions are; not working, ready to get employed and searching for a job (ILO, 2019). Therefore, Hussmanns, Mehran and Verma (1990, p. 97) postulated that unemployment encompass all individuals who meet the recommended age to engage in economic activities and meets the conditions of without work, that, individuals, are not self-employment or who are not engaged in any job that fetches them income; currently available for work, that is, individuals who are readily available to be engaged any income earn job or employment and; seeking work, that is, individuals who are making an effort to get income-earning job or employment. However, there are exceptions for individuals who are currently not working but will start work within the reference time frame and for individuals who are on an impermanent suspension.

The classical theory apprises that unemployment is a short term condition which free market force will automatically deal with it and restore maximum occupation in the economy but the theory of the Keynesian postulate that unemployment exists because of deficient aggregate demand for labour and that governments should use expansionary fiscal policy to help reduce unemployment in the economy (Banda, Ngirande, & Hogwe, 2016).

In the words of (Brunner & Meltzer, 1978, p. 1), "Unemployment can be defined as the difference between the amount of employment demanded and supplied at each real wage or as the difference between actual and equilibrium employment. Both definitions are in use currently". The Marxist theory explains that unemployment is as a result of the capitalist system where the means of production are owned by the bourgeoisie and the proletariat are exploited thereof through alienation and that unemployment can be reduced by replacing the capitalism with the socialism (Gyang, Anzaku, & Iyakwari, 2018). Moreover, the Keynesian hold the view that unemployment is normally triggered by insufficiencies in total demand over specific periods within the labour market such that adequate jobs are created to accommodate people who want to work (Keynes, 1936).

The rate of unemployment within every country is measured by the occurrence of unemployment and it is considered as a percentage by division of the whole of jobless persons by employed persons (Ademola & Badiru, 2016) nevertheless, (Hussmanns, Mehran, & Verma, 1990) apprise that unemployment rate is determined in relation to the total number of employed personnel and unemployed personnel.

Unemployment has been classified into different types and these are voluntary and involuntary redundancy, frictional and cyclical redundancy, seasonal and technological redundancy, structural and hidden redundancy (Soylu, Çakmak, & Okur, 2017).

2.1.4 The concept of economic growth

Economic progress is considered as part of the utmost imperative fiscal tools for plummeting poverty as well as improving the eminence of life (DFID, 2008). Economic progress is well-defined as the rise in gross domestic product or real gross per capital and it is, however, influenced directly by labour (employment), natural resources and capital and influenced indirectly by the collective demand, institutions, economic and fiscal policies, efficiency of the government (Boldeanu & Constantinescu, 2005).

According to (Jhingan, 2003), economic growth is the procedure by which the real per capita revenue of a nation rises over a long duration of the interval, and it is determined through the rise in the number of services and products manufactured within a nation. Hence, there is the much goods and improved services within a successive time period which serves as the basis of increasing prosperity through the good level of comfort of the people and reduction in the disparity of revenue delivery in a broader perspective (Ademola & Badiru, 2016).

Gross domestic product which often abstracted as economic development is appreciated as a balanced practice of raising the industrious ability of the individuals and henceforth, of rising general revenue, being categorized by greater rates of rise of per capita productivity and whole factor output, particularly labour output (Seth, John, & Dalhatu, 2018). Economic growth is significant once the degree of development is considerably greater than inhabitants growth since it has to cause a development in individual wellbeing through creating of job opportunities and hence strong demand for labour, the central and often the only strength of the poor (DFID, 2008).

2.1.5 Theoretical reviews of Okun's Law

In Arthur Okun's studies on the Potential GNP: Its Measurement and Significance, he apprised that maximum employment is an act of policy goal and that it should be linked to a correspondence target of aggregate demand and production (Okun, 1962). Okun's Law explains the relationship that exists between the variations in unemployment and the variations in economic (Gross Domestic Product) in order to determine the possible output. The potential output is the highest level of real GDP output at maximum employment and Okun's Law is the measurement of this output in relation to human capital input. He postulated that a GDP raise higher than 3% on middling is required to lower unemployment (Okun, 1962) however, the rate is not constant but rather hinge on the country growth of the employment power and employment output. More so, it states that once unemployment drops by 1%, Gross National Product increases by 3%. Also, Okun apprised that quarterly alterations in the rate of unemployment were connected to quarterly real gross domestic product growth and aberrations of unemployment rate from its non-accelerating inflationary level which is connected to aberrations of gross domestic product from its highest are the two the significant empirical relationship between economic growth and unemployment (Daly & Hobijn, 2010). According to Noor, Nor and Ghani (2007) there are two (2) approaches that can be employed to develop the Okun's elasticity constant and these are the output- gap technique, which is shown below:

$$X_t - X_t^* = b(Z_t - Z_t^*) \dots\dots\dots (1)$$

Z_t = actual production, Z_t^* = possible production, X_t = normal unemployment, Z_t^* = possible unemployment, b = Okun's constant.

Okun's first difference is the next approach to estimate the Okun's coefficient, which is shown below:

$$\Delta X = \alpha - b (\Delta Z / Z) \dots \dots \dots (2)$$

An additional alternative is to exam the comparative output to unemployment variations

$$(\Delta Z / Z)_t = \alpha - b \Delta X_t + \epsilon_t \dots \dots \dots (3) \quad \log Z_t = \alpha - b \log X_t + \epsilon_t \dots \dots \dots (4)$$

Approximation of b will give the Okun's coefficient. This coefficient shows that the relationship between the rate of unemployment and economic progress (GDP) rate is negative.

2.1.6 Empirical literature

Various empirical studies will be explored to help bring out the relevant information needed in these studies. Numerous scholars have conducted research works to examine the relationship that exists between the rate of unemployment and economic development rate of many jurisdictions. Nonetheless, contradicting findings have been established due to factors such as the jurisdiction of study, the available and source of data for the study, the econometrics technique applied and many others.

In the mid- 20th century, Harrod and Domar made the first research studies on the relationship between unemployment and economic progress (GDP) rate (Quy, 2016). Their studies emphasized on possible dysfunctional aspects of economic growth such as ways in which economic progress could go hand-in-hand with increasing unemployment. Harrod and Domar studies were grounded on critical issues of equilibrium which boils down to an assessment between the normal growth rate which was dependent on the rise in the human resource and the warranted economic growth rate which is also reliant on the saving and investing behaviours of households and firms (Solow, 1956).

Sato (1964) stated that there is an equal influence in increasing output of production and subsequent influence of increase employment based on the nature of available income and that the situations surrounding the availability of income for production are expressed as the economic growth rate. The equilibrium among growth rates would warrant full occupation for unemployed persons and full utilisation of income stock in the long term. Moreover, Sato (1964, p. 1), apprised that "when the economy deviates slightly from the natural growth rate the consequence would be either growing unemployment or prolonged inflation since the system has no built-in equilibrating force".

However, Solow model introduced new conceptions into the debate of economic growth by discarding the relationship between economic progress and unemployment as peripheral (Quy, 2016). Solow (1956) indicated that production does not occur under the assumption of stationary proportions which at the long run causes dysfunction aspect of economic growth.

Nonetheless, Solow accepted all the other assumption stipulated by the Harrod and Domar Model of economic growth except stationary proportions which will lead to dysfunction of economic development in the long-term (Schiliro, 2017). Solow's model, therefore, assumes that gross domestic product (GDP) is produced according to a total production function technology.

Neto and Silva (2013) also explained that there are four (4) main ways of explaining the relationship between unemployment and economic growth. These four (4) ways are; capitalizations effect which demonstrations an adverse correlation between unemployment and economic growth; creative obliteration outcome which classifies an optimistic relation between development and unemployment; series of saving outcomes which leads an adverse connexion between unemployment and growth; and as a final point, organisation failure outcome which leads to an adverse connexion between unemployment and growth.

Seth, John and Dalhatu (2018) stated that there are no relationships between the rate of unemployment rate economic growth rate in Nigeria in the longterm after employing the ARDL Bound Testing and the Parsimonious Error Correction Model (ECM) of the ARDL Model to test the Data for the period 1986 to 2015.

More so, outcomes of the Parsimonious Error Correction Model show that in the short-run, a 1% rise in unemployment leads to a 20.6% rise in economic growth (real gross domestic product).

Gyang, Anzaku and Iyakwari (2018) used Augmented Dickey-Fuller Test (ADF) to examine the stationary properties of unemployment, inflation and economic growth (real gross domestic product) in Nigeria of the periods 1986 to 2015 and also used Johansen Co-integration Test as well as Granger

Causality Tests to check for cointegration in the long-term and short-term and also test for the causality between the rate of unemployment, inflation rate and economic progress respectively. However, the findings showed that there is a short-term and long-term relationship between the rate of unemployment, inflation rate and economic progress rate and also the findings of the Granger Causality Test also show that unemployment and Inflation were not statistically substantial in explaining progress rate in the nation for the periods under review.

Kreishan (2011) also conducted a study on the connexion between unemployment and economic growth in Jordan by the application of Okun's law Approach by analyzing the yearly time series data for the duration of 1970 to 2008. The answers of the studies show that economic progress does not influence unemployment and that there is no connection between economic growth and unemployment in Jordan and more so, the Okun's law which stipulates that there is an adverse connection between economic progress and unemployment does not hold in Jordan.

Levine (2013) apprised that the relationship that exists between economic development rate and the rate of unemployment might be a loose in the shortterm because it is not rare for the rate of unemployment to demonstrate a sustainable deterioration which sometimes after other bold measures of economic policy plans have yielded a positive results and this is usually mentioned to be a lagging economic pointer. However, the finding of the studies shows that there is an adverse link between unemployment and economic progress in the long-term because so long as development in the real gross domestic product (GDP) surpasses development in employee productivity, service will upsurge. This will cause a vacancy within the production sector and this will eventually reduce unemployment in the long-run.

Özel, Sezgin, &Topkaya (2013) conducted a study to investigate the fiscal growth, productivity and unemployment data for seven industrial nations (G7) from the year 2000 to 2011. The findings of the studies revealed that there is a strong significant negative relationship between economic development and unemployment within the period 2000-2007 which is marked the pre-crisis period. More so, the finding of the studies also revealed that there is an insignificant and loosed adverse relationship between unemployment rate and economic development rate within the period of 2008-2011 which marked the post-crisis period.

Soylu, Cakmak and Okur (2017) applied Panel Unit Root, Pooled Panel OLS and Panel Johansen Co-integration test to examine the relationship between economic progress and unemployment in Eastern European Countries for the period of 1992-2014 within panel data framework. The findings of the studies revealed that unemployment and economic growths were stationary at first level. However, the findings of studies also revealed the presence of an adverse long-term cointegration between unemployment and economic progress. More so, economic progress positively causes a change in unemployment which means an upsurge in economic progress will eventually lead to a drop in unemployment.

Studies by Birchenall (2002) on development and unemployment (without market resistances) also indicated that an increase in economic development by the substitution of opportunity cost of capital which will eventually affect unemployment positively because labour or human resource will still be part of the substituted opportunity cost of means of production and this will lead to greater unemployment of the unskilled workers.

3.0 METHODOLOGY

3.1 Introduction

This section outline the detailed steps of the various research approaches to be used in helping to achieve the research objectives of this study. This includes five sections which are the Data Source, Measurement of Variables, Model specification, and the Estimation strategy.

3.2 Data Source

The study employed secondary macro-economic data that was downloaded from the World Development Indicator for the period 1991-2018. The data of the study was a time series data where its observations were based on multiple variables over some period of time and were arranged in sequential order. The main variables under study are two variable which is economic growth proxy by GDP growth (annual %) and Unemployment proxy by Unemployment, total (% of the total labour force). Nevertheless, the sample of the study was based on the availability of the data set and the importance of the chosen variables and how they affect each other.

3.3 Measurement of the variables of this study

The variables used in this study were measured as; economic growth was proxy by annual Gross Domestic Product which is the quantity of economic output that accounts for the effects of inflation or deflation. The rate of Real GDP is how much real GDP grows from one period to the next. Thus, the rate of Real

GDP is calculated as follows;

Current Real GDP - Previous Real GDP

$$\text{Real GDP} = \frac{\text{Current Real GDP} - \text{Previous Real GDP}}{\text{Previous Real GDP}} \times 100 \dots \dots \dots (1)$$

(1)

Previous Real GDP

Whilst, the Unemployment rate proxy by Unemployment, total (% of the total labour force) is the percentage of unemployed persons in the total labour force. The rate of unemployment is the number of persons searching for a job divided by the total labour force. Thus, the unemployment rate is calculated as follows;

$$\text{Number of Unemployed Persons} \text{ Real GDP} = \frac{\text{Number of Unemployed Persons}}{\text{Labour Force}} \times 100 \dots \dots \dots (2)$$

Labour Force

3.4 Model Specification

Okun law, which explains the link between unemployment and economic growth, was used as a theoretical basis. The classical theory explains that unemployment is a short term condition which free market force will automatically deal with it and restore maximum occupation in the economy (Banda, Ngirande, &Hogwe, 2016) whiles the Keynesian hold the view that unemployment is normally triggered by insufficiencies in total demand over specific periods within the labour market such that adequate jobs are created to accommodate people who want to work (Keynes, 1936). The Marxist theory also explains that unemployment is as a result of the capitalist system where the means of production are owned by the bourgeoisie and the proletariat are exploited thereof through alienation and that unemployment can be reduced by replacing the capitalism with the socialism (Gyang, Anzaku, &Iyakwari, 2018).

The study, therefore, adopted Okun's (1962) model presented by Ademola

and Badiru (2016) which integrated economic growth proxy by Annual Gross Domestic Product as the independent variable and Unemployment rate proxy by Unemployment, total (% of the total labour force) as the dependent variable. The model is specified as:

$$Y = \beta_0 + \beta_1 U_t + \varepsilon_t \dots\dots\dots (3)$$

Hence; Y denotes the unemployment rate, U denotes the economic growth.

Modification to model (3) is as follows:

$$Unempl = \beta_1 + \beta_2 Rgd_p + \varepsilon_t \dots\dots\dots (4)$$

Hence; Rgd_p denotes the rate of GDP growth (independent variable), $Unempl$ denotes unemployment rate (dependent variable), β_1 – Parameters and ε_t - Error term (white noise)

Therefore equation (2) will be log-linearized in order to critically transform it to estimable form: $\ln Unempl = \beta_1 + \beta_2 \ln Rgd_p + \varepsilon_t \dots\dots\dots (5)$

The apriori expectations are as follows: $\beta_1 < 0$ (i.e. β_1 is non-negative value)

4.1 Estimation strategy

This section talks about the estimation strategies employed in analysing the data (time series) that were extracted for the study. The examination of the data was based on three important steps which were; stationarity test; shortrun and long-run Test; and Granger causality test. Firstly, the stationarity test was conducted to make sure all the variables were stationary I(0) or at first difference I(1). Secondary, cointegration test was conducted to test the longrun co-integration among the variables of the study and further proceed to test for short-run relationship between the variables and finally, the Granger causality test was conducted to explain the causal relationship between the variables of the study or causal direction among the variables of the study.

4.2 Unit Root Test

The unit root test is the principal stage in the estimation procedure. It was carried out on the variables (Unemployment and Economic growth)

employed in the study to test if the study variables are stationary at levels I(0) or stationary at first difference I(1) since there will be spurious regression results if a non-stationary series data is regressed on another non-stationary data (Gujaraty, 2004).

The major principle underlying the time series is the stationary levels of the data in question. Since the data (time series) was adopted to evaluate the relationship between variables for future prediction and analysis, it was, therefore, expedient to check whether the velocity (fluctuation) was constant over a long-run, check whether the variance and co-variance were invariant (stay constant) over time.

Hence, the study used both Augmented Dickey-Fuller (ADF) unit root test by

Dickey and Fuller (1979) and the Phillips-Perron (PP) unit root test by PhillipsPerron (1988) to test and confirm the stationarity of the variables

(Unemployment and Economic growth) at levels and at first levels. Both the Augmented Dickey-Fuller (ADF) unit root test and the Phillips-Perron (PP) unit root test would test the alternative hypothesis against the null

hypothesis to check whether the data (time series) employed were non-stationary. Accepting or rejecting the null hypothesis depends on the t-test of the lags and the t-statistics. If the t-test of the lags is a lesser amount of than the critical point the null hypothesis of a presence of unit root is accepted.

4.3 The Autoregressive Distributed Lagged (ARDL) cointegration framework

Cointegration is the second stage of the estimation procedure. It was executed out to explain the long-term relationship between variables of this study (the rate of Unemployment and Economic growth rate). Series of literature in the field of economics has employed the Johansen cointegration approach in estimating the long-run relationship of variables. Most researchers have argued that this is the best when it comes to dealing with I(1) variables.

On the other hand, researches by earlier scholars introduced Autoregressive Distributed Lags (ARDL) which has become an alternative in attempting cointegration issue. These scholars believe that the ARDL approach has so many benefits that outweigh the benefit of the Johansen co-integration.

However, this study employed a cointegration method acknowledged as the “Autoregressive Distributed Lag (ARDL) bound test. The reasons for employing the ARDL bound test are; The ARDL cointegration procedure is comparatively more efficient when the size of the data of the study is small. This study data of study covers the period of 1991 to 2018 inclusive. Thus, the whole data set for the study is 27 which are quite good considering the scope and nature of the study; and also, the ARDL model will enable the ordinary least square (OLS) technique to estimate the cointegration once the lag of the model is identified. This makes the ARDL approach very the best model in this case and;

Finally, the ARDL method does not need the pretesting of the variables of the study involved in the method for unit roots as compared to other methods such as the Johansen approach. It is expedient to apply the Johansen technique when the variables of the study are stationary at levels I(0) but when all variables are stationary at first difference I(1) or the variables are at a combination of stationary at the level I(0) and stationary at first difference I(1), the ARDL model is the best.

ARDL model uses just two steps in its estimation. Firstly, the F-test is employed to decide the incidence of long-term relationship between variables under study.

Secondary, we approximate the short run error correction model.

4.4 ARDL Bounds test

This test was done following two main procedures. The first procedure was to estimate the ARDL equation by using the ordinary least squares estimator in order to check if there exists a long-term relationship among the variables of the study. The F-test is then conducted for the combined significance with respect to the elasticity constants of variables at their lagged state.

We check the null hypothesis in contradiction of the alternative hypothesis as follows:

$$H_0 = \delta_0$$

$$H_1 \neq \delta_0$$

The critical values give rise to the test for cointegration when the variables of the studies are stationary at levels I(0) or stationary at first difference I(1). There is an assumption on the lower bound value in that the order of

combination of the explanatory variable is zero, or $I(0)$ with the order of integration of the upper bound being one, $I(1)$. The following interpretation is given;

- 1) When the F calculated is more than the higher bound, we conclude that there is co-integration between the two variables of the study. Then, we discard the null hypothesis of no relationship between the variables of the studies.
- 2) When the F calculated drops lower than the lesser bound figure, then we cannot discard the null hypothesis of no relationship among the variables of the studies.
- 3) When the F calculated falls between the two bounds that are lower and upper bound, there is no conclusive decision whether the variables of the studies are cointegrated or not.

Imperatively, we have to proceed with the bound test, we impose a restriction on the ARDL to approximate the long-term relationship between the dependent and independent variables of the studies.

4.5 Test for Causality

Test for causality is the final stage of the estimation procedure. It was carried out to inspect the causal relationship between the two variables (the rate of unemployment and economic growth rate). The studies employed Engle & Granger (1989), Granger causality test to know causal relationship among the two variables of the study, whether one variable directly causes the other variable or none of the variables has an influence on the other.

4.6 ANALYSIS OF DATA

4.6.1 Introduction

The analysis of data of the studies is presented in this section. It is divided into subsection section which outlined the statistical trends of the variables of the studies, the unit root test, the cointegration bound test, the long run and the short run ARDL error correction models and the Granger causality.

4.6.1 Unemployment trend in China

The annual unemployment rate of China is within the range of 3.76% and 4.89% in 2007 and 1991 respectively. This shows that out of 100 people who are actively searching and willing to work to receive some income only 4 to 5 people are unable to secure employment. This really shows that unemployment rate in China which falls in the range of 3.76% to 4.89% is not high but moderate and it really shows how the economy of China is able to contain most of the available human capital or labour force.

Although, there is some linear additional upsurge in the rate of unemployment from 2010 where the unemployment rate was 4.12% to the current year 2018 where the unemployment rate is 4.71%. However, it can be perceived that the linear increase in the unemployment rate in each year from 2010 to date is reasonable.

The trend of the unemployment rate in China from 1991-2018 is interesting because of its instability shown in the graph below. There were many different rates of changes in the unemployment rate for a period of 27 years. From the graph below, China experienced its highest unemployment rate in 1991 with an unemployment rate of 4.89% thus among 100 active people who were willing and searching for a place to work in 1991, it was only 5 of them who couldn't get employment or job to do.

The rate of unemployment began to decrease from 1992 with a rate of 4.39% to 1994 with 4.34% where it then began to rise again from 1995 with 4.55% to 1999 with 4.7%. In 2000, the rate began to decrease with a rate of 4.53% which is a 0.17% decrease from the 1999 rate of 4.7% until the unemployment fell to China's lowest unemployment rate of 3.76% thus only 4 out of 100 people who are active and willing to work didn't get employed. From 2010 the unemployment rate of China has continued to rise from a rate of 4.2% to 4.7% which is its current unemployment rate. Thus currently, 5 out of 100 people who are active and willing to work didn't get employed.

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4.6.2 Economic growth trend in China

China within the last four decades, that is, 1979 to 2017 has transformed its economy from the state of a poor developing nation to a state of being one of the most powerful developed markets in the world. The average annual real productivity output of China has grown to an approximate of 10% which according to the World Bank makes them one of the fastest growing, expanded and sustained economies in the world. This change in transition has caused China to eradicate about 800 million persons out of poverty (Morrison, 2018).

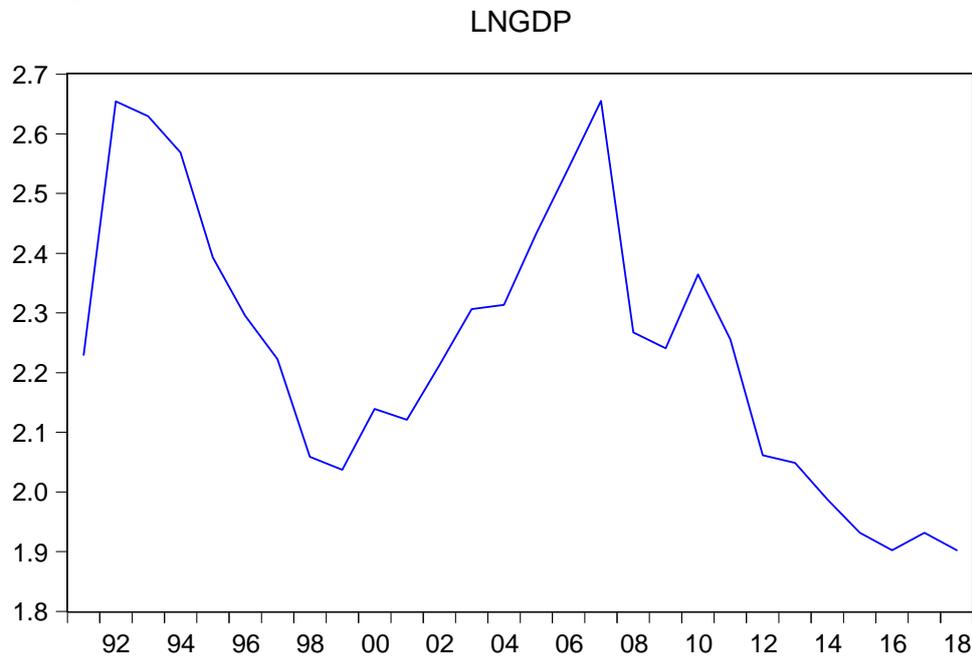
According to the annual time series data available at World Development Indicator, the annual economic growth (GDP) rate of China is within the range of 14.23% and 6.7% which represents the highest rate of economic growth (GDP) and the lowest economic growth (GDP) rate respectively from 1991-2018. This shows that from 1991 to 2018, a variation in economic progress (GDP) rate is within the highest 14.23% and lowest at 6.7%.

Though the rate of economic growth (GDP) is changing, in 1992 China had experienced its highest increase in economic growth (GDP) rate with a change of 4.93%. This shows that there was a lot of labour output which led to an increase in production. Nonetheless, between 2003 and 2004 China experienced its lowest change of economic growth (GDP) rate with a rate of 0.07%. Which indicates there was little output which led to constant or little addition to 2003 economic growth (GDP).

The trend of economic growth (GDP) rate in China from 1991-2018 is fascinating because of its unpredictability shown in the graph below. There were many dissimilar rates of changes in the economic growth rate (GDP) over the period of 27 years. From the graph below, in 1991 China experienced 9.3% economic growth (GDP) rate and then the economic growth (GDP) rate increased to 14.22% in 1992 which represents a 4.92%

which indicate China highest increase of economic growth (GDP) rate up to date but represent the second highest economic growth (GDP) rate.

Economic growth (GDP) begun to continuously decrease from 1993 with the rate of 13.86% to 2001 with rate of 8.34% and then begun to gain some strength from 2002 with the rate of 9.13% to 2007 with the rate of 14.23 which is the highest economic growth (GDP) rate up to date. Since 2007, economic growth (GDP) has diminished from 2008 with a rate of 9.65% which represent the highest decline in economic growth (GDP) rate up to date.



4.6.3 Analysis of the Unit Root Test

In other to estimate non-spurious regression results, I first estimated the stationarity of the variables by employing the Augmented Dickey-Fuller (ADF) and the Phillips and Perron (PP) unit root test and the following results were obtained.

Table 4.1 below shows the results obtained for the Stationarity of variables.

variables	Level		First Difference	
	ADF	PP	ADF	PP

	Constant	Constant	Constant	Constant
Constant				
Inuemp	0.512	0.512	0.003***	0.003***
Ingdp	0.354	0.354	0.028***	0.028***

*We test the null hypothesis of the series being non-stationary or has a unit root against the alternative hypothesis of the existence of stationarity. Mackinnon (1996) critical values was used in rejecting the null hypothesis by both ADF and PP test, ***, **, * signifies the rejection of the null hypothesis of the existence of a unit root at 1%, 5%, and 10% significance levels respectively.*

It can be ascertained from table 4.1 that, tests by ADF and PP clearly shows that the variables (economic growth (GDP) and unemployment) of study were not stationary at level I(0) since ADF t-statistics of -1.304 for economic growth (GDP) and -2.447 for unemployment were less than the critical values of 1%, 5%, and 10% respectively and PP t-statistics of -1.304 for economic growth (GDP) and 2.519 for unemployment were also fewer than the critical values of 1%, 5%, and 10% respectively.

Nonetheless, the variables (economic growth (GDP) and unemployment) of the study was stationary at first level I(1) since ADF t-statistics of -5.707 for economic growth (GDP) and -6.076 for unemployment were greater than the critical values of 1%, 5%, and 10% respectively and PP t-statistics of -5.706 for economic growth (GDP) and -6.284 for unemployment were also more than the critical values of 1%, 5%, and 10% respectively.

Therefore we can conclude that the variables (economic growth (GDP) and unemployment) of the study were not stationary at level but they were all stationary at first difference which means that the data of variables of the study are good to use in this study.

4.6.4 Bounds test

Bound test expedites to check the long run relationship between the variables (economic growth (GDP) and unemployment) of study. More so, it was expedient to the position of the F-statistics within the critical value bound of significance.

Table 4.2 results of bounds test

<i>Testing for the existence of a long run relationship among the variables in the ARDL</i>				
K	95% lower bound	95% upper bound	90% lower bound	90%
	upper bound			

1	4.49	5.73	4.04	4.78
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Model	Calculated F-statistics	Inference
Ingdp(Inuemp)	6.499611**	Cointegration

From table 4.2 above, the calculated F-Statistics (6.499611) is bigger than both the 95% and 90% upper bound confidence level of 5.73 and 4.78 respectively from the equation. Therefore, from this finding, it is postulated that there is cointegration among the dependent variable (unemployment) and the independent variables (economic growth (GDP)). This is in confirmation with the studies of Soyly, Cakmak and Okur (2017), Banda, Ngirande and Hogwe (2016) and Mosikari (2013).

4.6.5 Results of the Long Run Unemployment

The long-run relationship between the dependent variable (unemployment) and independent variable (economic growth (GDP)) was estimated by the ADRL. The long-run elasticity is represented by the coefficients of the dependent variable (economic growth (GDP)).

Table 4.3 Estimated long run inflation model

Dependent variable: Inuemp

Regressors	Autoregressive Distributed Lag Model	
	Long run Elasticity	t-statistics
Ingdp	-0.320	(-3.878) **
C	2.173	(12.045)

***, **, * denotes significance level at 1%, 5% and 10% respectively. Values in parenthesis are t-statistics. ARDL (1,4) was based on the Schwarz Bayesian criterion

From table 4.3 above, the long run elasticity coefficient of the dependent variable (economic growth (GDP)) is adverse and statistically significant at the 10% error level. With respect to the coefficient, a one per cent upsurge in economic growth will cause a 0.32% decrease in the unemployment rate. This confirms the assertions by Hua-chu (2008), Li and Liu (2012) and Karabulut and Gokhan (2010) that, a long run relationship exist between economic growth (GDP) and unemployment. Accordingly, the null hypothesis that there is no long-run relationship between unemployment and economic growth in China is rejected.

Null hypothesis	F-statistics	Prob.
Inuemp does not Granger cause lngdp	1.17741	
		0.3460
lngdp does not Granger cause Inuemp	1.81217	0.1811

From the table 4.5 above, unemployment does not Granger cause economic growth (GDP) in the long run and short run because the F-statistics of 1.177 is insignificant and also economic growth (GDP) does not Granger cause unemployment in the long run and short run because the F-statistics of 1.812 is insignificant. This confirms the assertions by Mosikari (2013) that, there is no causal relationship between economic growth (GDP) and unemployment.

Though there is a negative relationship between economic growth (GDP) and unemployment in the long run and the short run, they do not have a causal relationship and that other factors might cause their relationship in both long run and short run and not necessary the variables themselves.

5.1 Conclusion

This study concentrated on the impact of unemployment on economic growth in China. The study employed a time series data for the period of 1991 to 2018 from World Development Indicator (WDI) which represent a 27-period set. The econometric model that was used for the analysis was an ARDL model. Here both the short run and long-run relationship between the independent variable (economic growth rate) and dependent variable (unemployment rate) were estimated. It was found that the unemployment rate has a short run and longrun relationship with the economic growth rate in the economy of China. This simply implies that to maintain a sustainable unemployment rate, much attention should be paid to the economic growth rate in even though there is no causality them, other external factors might have caused them (unemployment rate and economic growth rate) to have a negative relationship.

6.1 Recommendations

According to the results shown above, the unemployment rate and economic growth rate have a short-run and long-run negative relation. So in other to reduce unemployment in China, there should increase economic growth by making arousing the desires of youth to engage in economic activities which will boost the gross domestic product.

Moreover, I will recommend further studies to be carried on the other macroeconomic factors such as inflation, interest rate, money supply growth, and the exchange rate which might cause unemployment rate and economic growth rate to have negative relations in both short-run and long-run in China.

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