The Effects of Inflation and Unemployment on Economic Growth in Kuwait: An ARDL Bound Test Approach

Afaf Abdull J. Saaed
Majeed A.Hussain

HexaTimes, USA

The Effects of Inflation and Unemployment on Economic Growth in Kuwait: An ARDL Bound Test Approach

Afaf Abdull J. Saaed[1] **Majeed Hussain**[2]

[1]*Associate Professor of Applied Economics, College of Business Administration American University in the Emirates Dubai International Academic City, email: afaf1955@yahoo.com*

[2]*Professor of Econometrics, College of Business Administration American University in the Emirates United Arab Emirates.Dubai International Academic City,E-mail:mhussain1950@gmail.com*

Abstract

In the present study examined the impact of inflation and unemployment on economic growth in Kuwait from 1977 to 2016, in two short-term and long-term phases was investigated and examined using Autoregressive Distributed Lag (ARDL)) approach to cointegration. The bounds tests suggest that the variables of interest are bound together in the long-run when inflation rate as well as GDP is the dependent variable. while there is no long run when the unemployment rate is the dependent variable. The associated equilibrium correction was also significant confirming the existence of long-run relationship. The results indicate also that there is no significant Granger causality from Unemployment to economic growth and From Unemployment to inflation and vise-versa in the short run. As a result, authorities should pay more attention to importance of inflation and unemployment in economic growth. The authorities should diligently endeavor to properly plan for economic progress and development.

Keywords: Inflation, Unemployment, Economic Growth. Cointegration, ARDL Bound Test VECM, Kuwait.

1. Introduction

The economic growth and development are the main objectives of any economic system such as Kuwait, short- term and long-term effects of inflation and unemployment on economic growth should be examined. Better recognition of the effect of inflation and unemployment on economic growth of the country and more appropriate allocation of resources and facilities could better control inflation and unemployment, which might result in an increase in economic growth and development. Thereby, short-term and long-term effect of inflation and unemployment on economic growth in Kuwait was discussed in this study. Unemployment has been categorized as one of the serious impediments to social welfare. Apart from representing a colossal waste of a country's manpower resources, it generates welfare loss in terms of lower output, thereby leading to lower income and wellbeing. The need to avert the negative effects of unemployment has made the tackling of unemployment problem to feature very prominently in the development objectives of many developing countries. Unemployment and inflation are two intricately linked economic concepts. Over the years there have been several economists and policy-makers trying to interpret the relationship between the concepts of inflation and unemployment.

The relationship between unemployment and inflation is commonly described as the Phillips curve. In the short term the Phillips curve happens to be a declining curve. The Phillips curve in the long term is distinct from the Phillips curve in the short term. It has been observed by the economists that in the long run the concepts of unemployment and inflation are not related Unemployment and inflation are considered as two of the main factors that cause underdevelopment in any country. The purpose of this paper is to examine the relationship between unemployment, inflation and economic growth in Kuwait using annual data over the period 1976-2016. Unemployment Rate in Kuwait decreased to 3.10 percent in 2013 from 3.40 percent in 2012. Unemployment Rate in Kuwait averaged 1.53 percent from 1983 until 2015, reaching an all-time high of 3.60 percent in 2011 and a record low of 50 percent in 1990 (World Bank,2015)

Hence, unemployment has received much attention among economic analysts, governments, and scholars in pursuit of better understanding such occurrence and henceforth be better able to harness the forces that breeds it. This study is a contribution to the growing literature aimed at understanding the relationship between unemployment, inflation, and economic growth rate using Kuwait data with a more extended and updated period of study (1977 to 2016). The relationships established herein may serve as a guide in both fiscal and monetary policy.

The paper has contributed to the body of existing literature and filled some gaps that were not discuss, and is significance to economic decision-makers, as it will assist us with the basic knowledge and skills needed to tackle the pressing issue of unemployment and inflation in Kuwait However, a good deal of research work has been carried out on unemployment and inflation worldwide, but not much has been carried out using the Kuwait's economy and within the scope of our analysis.

The structure of the paper is as follows: Section 2 briefly reviews the literature. Section 3 presents data and methodology. Empirical results are discussed in section 4. Concluding remarks are given in the final section.

2. Literature Review

There have been extensive studies about the effects of economic growth and inflation on unemployment in the literature. These studies predominantly have been on the relationship between economic growth and unemployment. Therefore, empirical studies about the effects of inflation and unemployment on economic growth also have begun to be conducted. In this section we will firstly review empirical studies on the relationship between unemployment and economic growth and then review empirical studies on the relationship between unemployment and inflation.

Unemployment is often defined by the classical economists as the excess supply of labor over the demand for labor which is cause by adjustment in real wage. The Classical or real-wage unemployment occurs when real wages for job are set above the market clearing level, causing number of job-seekers to exceed the number of vacancies. The unemployment is a measure of the prevalence of unemployment and it is calculated as a percentage by dividing the number of unemployed individuals by individuals currently in the labor force According to Jhingan (2003), unemployment can be conceived as the number of people who are unemployed in an economy, often given as a percentage of the labor force. Unemployment is also defined as numbers of people who are willing and able to work as well make themselves available for work at the prevailing wage but no work for them.

Classical and Keynesian schools classified unemployment into several types. According to classical school, there are two types of unemployment; these are voluntary and involuntary unemployment. Voluntary unemployment is the situation where individuals are able to work but are not willing to work at the prevailing wage rates. Contrary to that, involuntary unemployment is the situation where individuals are willing and able to work at the prevailing wage rates but does not find work. Classical thinkers believe that if the labor market is liberalized the flexibility of wages and prices guarantees reaching full employment at equilibrium, and in case unemployment occurs, it shall be voluntary. Keynesian thinkers argue that the key determinant of employment level is not the real wage, but the level of effective demand for labor, and that unemployment occurs due to inadequate national income, which should be increased to increase effective demand until sufficient to reach full employment. Keynesian school classified unemployment into four types; the first is frictional unemployment,which involves people being temporarily between jobs, searching for new better ones. The second is structural unemployment, which occurs because of dynamic changes in the structure of the economy, which results in a mismatch between the skills of workers looking for jobs and the vacancies available, either due to technological changes or capital intensity. The third is cyclical unemployment, which occurs because of economic cycles that lead to falls in aggregate demand or aggregate expenditure thus lower employment opportunities. According to Balami (2006), inflation is a situation of a rising general price level of broad spectrum of goods and services over a long period of time. It is measured as the rate of increase in the general price level over a specific period. To the neo-classical and their followers at the University of Chicago, inflation is fundamentally a monetary phenomenon. In the words of Friedman M. (1996), “inflation is always and everywhere a monetary phenomenon and can be produced only by a more rapid increase in the quantity of money than output.” To Hicks” inflation is a continuous rise in general price level.” Johnson,“inflation is a sustained rise in prices of goods and services.

The relationship between economic growth and the unemployment rate in the short run may be a loose one One reason that unemployment may not fall appreciably when economic growth first picks up after a recession’s end, is that some firms may have underutilized employees ontheir payrolls. This is because laying off workers when product demand declines and rehiringthem when product demand improves has costs. and thenreview empirical studie s on the relationship between unemployment and inflation.Mohsenia and Jouzeryan (2016)

investigated the relationship between, Unemployment rate, Inflation rate and Economic growth. in Iran for the period 1996-2012. The result of this study revealed, both in the short run and long run, a negative effect of inflation and unemployment on economic growth. They concluded that policy- makers could attempt to control inflation and educe unemployment to achieve sustainable economic growth. Mehrnoosh M and Feizo la h

(2016) examined the role of inflation and unemployment on economic growth in Iran fro 1996 to 2012. The effect of inflation and unemployment on economic growth in two short-term and long-term phases was investigated and examined using Autoregressive Distributed Lag(ARDL) The finding showed the significant and negative effect of inflation and unemployment on economic growth in long term, which indicated that inflation and unemployment decreased economic Mohseni, M. et al (2016) considers a re-examination of the role of inflation and unemployment on economic growth using the ARDL regression model. The results showed a long run negative effect of inflation and unemployment on economic growth. Yelwa et al (2015) examined the relationship between inflation, unemployment and economic growth in Nigeria the period 1987-2012 findings derived that both unemployment and inflation have negative impact on economic growth. They conclude that Nigerian government should improve macroeconomic policy instruments in order to achieve a stable economic environment that will increase its domestic output. Aminu and Manu (2014) carried out research on analysis of unemployed resources and inflation in Nigeria from 1986 to 2010 using OLS technique and found that both unemployed human resources, rate of natural resource production (i.e rate of tapped resources), total inflation have positive impact on rate economic growth in Nigeria.

Shahid M (2014), study the effect of inflation and unemployment on economic growth in Pakistan via the ARDL model approach found that a long run relationship between the variables existed. Saidu M, and Nwokobia *at el.* (2013) found the effect of Unemployment and Inflation on Wages in Nigeria. The Ordinary Least Square Method initially used t-statistics shows that unemployment significantly affects wage rate, Durbin-Watson statistics which shows that the model is not spurious. The Unit Root Test results reveals that all variables are stationary on 1%, 5% and 10%. The Granger Causality Results shows that unemployment and inflation does not granger causes wage rate. This result indicates one-way causation flowing from unemployment to wage rate not inflation to wage rate. The unemployment has a positive effect on wage rate but on the other hand inflation cannot affect on wage rate. Umar and Razaullah (2013) found the impact of GDP and inflation on unemployment rate in Pakistan. They are using the time series data since 2000 to 2010 and run regression through SPSS. The results indicate that the F- test value is very low and below the value of 4.00. R square has limited variation i.e. 0.70% and 22.8% from the inflation to Gross Domestic

Product and unemployment. They found that inflation have negative for Gross Domestic Product and have negative correlation with unemployment. Mahmoud Ali Jaradat(2013) has analyzed impact of inflation and unemployment on Jordanian GDP from (2000-2010) and the results of the study indicate that there is a negative relation between unemployment and GDP, and there is a positive relation between Inflation and economic growth. Muhammad Umair and Raza Ullah (2013) have analyzed the impact of GDP and inflation on unemployment rate of Pakistan Economy in (2000-2010) and their study concluded that inflation has a role which influential but for GDP and unemployment with insignificant levels in the macroeconomics factors of Pakistani economy.Umaru and Zubairu (2012) found the effect of Inflation on the Growth and Development of the Nigerian Economy. They are using the time series data for the time of 1970 to 2010 from Central Bank of Nigeria. They used the Unit Root Test and Granger Causality Test to estimate the impact of inflation on economic growth. The results show that all variables are stationary on first difference they are using Granger Causality Test. The result of Granger Causality Test shows that there is one-way causation flowing from GDP to inflation. Kreishan (2010) investigate the relationship between unemployment and economic growth in Jordan through the implementation of Okun's law, using annual data covering the period 1970-2008, The empirical results reveal that Okun's law cannot be confirmed for Jordan. Thus, it can be suggested that the lack of economic growth does not explain the unemployment problem in

Jordan. Omoke and Ugwuanyi (2010) tested the relationship between money, inflation andoutput by employing cointegration and Granger-causality test analysis. The findings revealed no existence of a cointegrating vector in the series used. Money supply was seen to Granger cause both output and inflation. The results suggest that monetary policy can contribute towards price stability in Nigerian economy since the variation in price level is mainly caused by money supply. This shows that inflation in Nigeria is to much extent a monetary phenomenon. They find empirical support in context of the money-price-output hypothesis for Nigerian economy. M2 appears to have a strong causal effect on the real output as well as prices. In a study on Jordanian data from 2000 – 2008, tests of co-integration revealed long-run association between unemployment and economic growth. On the other hand, the results support that unemployment and output is unrelated suggesting that Okun's law is not valid for Jordan (Kreishan, 2010).Hussain and Iqbal (2010) investigated a coherent relationship between Economic Growth and Unemployment in Pakistan. They used the time series data since 1972 to 2006. They used the Augmented Dickey Fuller test for Unit Root, all the variable are stationary on first level difference then they used the Johansen Co-integration to find the long run relationship between variables. The results of Co-integration test intimate that GDP Growth, Unemployment, Labor, Capital, Openness of Trade have long run relationship. The overall results intimate that GDP growth has negative relationship with unemployment. In summary, the above literature reviews show that inflation is vary form economy to economy but most of the studies indicate that there is a positive relationship between inflation and economic growth. On the other hand, the above literature reviews showed that there is a negative relationship between unemployment and economic growth. Therefore, the impact of inflation and unemployment on economic growth is still ambiguous despite the truly enormous amount of research that has been undertaken on inflation, unemployment and economic growth there remain serious methodological issues. We could not find any study that related to Kuwait, therefore, further studies are required in this field. From both theoretical and empirical restructure reviews analyze above, this study will have to answer four salient questions regarding the impact of inflation and unemployment on economic growth in Kuwait for the period 1977-2016. Which are:

- Does an association exist between unemployment and GDP in Kuwait? If so, is it positively or negatively related to unemployment rate?
- Does an association exist between inflation and GDP in Kuwait? If so, is it positively or negatively related to inflation rate
- Does an association exist between unemployment and Inflation in Kuwait? If so, is it positively or negatively related to unemployment rate?
- Is the impact of the inflation on unemployment direct or indirect?
- What is the direction of association between unemployment rate and GDP?

The direction of association between unemployment rate, inflation rate and GDP for Kuwait may consist of four possible alternatives. These are:

- No association.
- unemployment rate affects GDP.
- Inflation rate affects GDP and vise-versa.
- Inflation rate affects unemployment rate and vise-versa.

3. CONCEPTUAL MODEL

The variables used in this study are unemployment rate, inflation rate and economic growth in Kuwait. These variables are obtained from different sources, including, different volumes of the International Financial Statistics (IFS) Yearbook, the World Development Indicators (WDI, 2016). International Monetary Fund (IMF,2014), Word Bank (WB,2016).The data are annual 1977-2016.

3.1. METHODOLOGY

We investigated the relationship between unemployment, inflation and economic growth, by time series analysis. Spurious regression may be emerged if the time series are not stationary (Gujarati, 2003). Therefore, stationarity of the variables firstly should be checked in the analysis of time series. We tested the stationarity of time series by Augmented Dickey-Fuller (ADF)(1981), Phillips-Perron (PP) (1988) tests and then examined the long run and short-run relationships among the variables by ARDL bound testing approach and Vector Error Correction Model (VECM). Co-integration means that there is a stationary combination of two time series which are not stationary at their levels. Engle-Granger (1987), Johansen (1988) and Johansen and Juselius (1990) tests are generally used for the co-integration test in the literature. Time series are required to be stationary at the same level to apply these co-integration tests. ARDL bound testing approach, which were developed by Pesaran and Shin (1995) and Pesaran et al. (2001), enables to apply co-integration tests to the time series which have different integration levels. However, VECM can be obtained by a simple linear transformation simultaneously in this approach. Also, it is possible that there is no co-integration relationship if all data are when there is limited number of data in the analysis of time series. So ARDL bound testing approach become prominent. But since the critical values of Pesaran et al. (2001) were determined by considering that the variables were $I(0)$ or $I(1)$, variables should be tested in the event that the variables were $I(2)$. ARDL bounding test approach has better statistical properties than Engle- Granger technique (1987) is used for two variables. On the other hand,JohansenCointegration(1988) is used for more than two variables.So, JohansenCointegration has advant age on Engle and Granger. Johansen and Juselius (1990)extended VAR model. However, it is only suitable with certain conditions like itdeals with large sample size and preconditions for the cointegrated VAR is that all variables should be integrated of same order i.e. I(1). ARDL technique does not only overcome these issues but it has also several other advantages. ARDL is more suitable than Johansen and Juselius cointegration in case o f small sample size

Pesaran HM, Shin Y. (1999). also it can be used whether variables ar purely I(0), purely I(1) or the mixture of both I(0) and I(1) Pesaran M, Pesaran B.(1997). it captures appropriate umber of ags in data generating process particularly in general to specific process as is reported by Laurence son and Chai(2003). the ECM can be obtained from bound testing approach through simple OLS transformation.ECM shows short run to long r u n adjustment mechanism without the loss o f long r u n information Pesaran HM, Shin Y. (1999). However, ARDL approach makes the model dynamic. Although ARDL can be used whether all variables are stationary at level i.e. I(0) or I(1) or the mixture of both Pesaran HM, Shin Y. (2001,1999). But we cannot use ARDL if any of the variable under investigation is stationary at second difference i.e. I(2) as bound testing approach is based on I(0), I(1) or mixture of these two sets we check the unit root property of each variable to confirm that any of the variable should not be stationary at second difference. For this we use Augmented Dickey-Fuller (ADF) (1981), Phillips-Perron (PP) (1988) tests. All these tests confirm that none of the variable is stat ionary at s e c o n d difference I(2). In this study, to perform objective the Auto Regressive Distributed Lag (ARDL) bound testing approach was employed which was originally introduced by Pesaran and Shin (1999) and further extended by Pesaran et al., (2001). This approach builds based on the Unrestricted Error Correction Model (UECM) which has more advantages compared with the conventional cointegration approaches.Therefore, this study used the ARDL bound testing approach to achieve the objective. Moreover, in this study, the economic growth was used as dependent variable, while the inflation rate, and unemployment were considered as independent variables. The long-run relationship among unemployment, inflation and economic growth in Kuwait may be expressed as:

$$GDP_t = \alpha + \beta_1 INFR_t + \beta_2 UNR_t + e_t \qquad (1)$$

Where :

UNR is the unemployment rate,
GDP_t is the Gross Domestic Product in millions
INFR is the rate of inflation and ε is error term.
e is the error (White noise)

3.2. ARDL BOUNDS TESTS FOR COINTEGRATION

ARDL bounds test approach for cointegration, known as the autoregressive-distributed lag (ARDL) of Pesaran Shin and Smith (2001), has become most popular amongst researchers. The bounds test approach has certain econometric advantages in comparison to other single equation cointegration procedure. They are as follows: 1) endogeneity problems and inability to test hypotheses on the estimated coefficients in the long-run associated with the Engle-Granger method, are avoided; 2) the long-run and short-run parameters of the model in equation are estimated simultaneously; 3) the bounds test approach for testing the existence of long-run relationship between the variables in levels is applicable irrespective of whether the underlying time series variables are purely I(0), I(1) or fractionally integrated; 4) the small sample properties of the bounds testing approach are far superior to that of multivariate.

Bound test model (equation 2) below with three independent variables based on the estimation of unconstrained error correction models by least-square method. Equation (2) includes lags difference of dependent and independent variables and one lag of independent variables. Each lag difference of dependent and independent variables points out short run dynamics and show the possible changes in the dependent variable, while ratio of each lag value coefficient to the coefficient of dependent variable shows the long run dynamics. In this paper to implement the ARDL bounds test for cointegration, the following unrestricted regression equations have been formulated as representation of equation 1 as follows:

$$DGDP_t = \alpha_1 + \sum_i^n \beta_3\, DGDP_{t-1} + \sum_i^n \beta_1 DUNR_{t-1} + \sum_i^n \beta_2\, DINFR_{t-1} + \delta 1 GDP_{t-1} + \delta 2 UNR_{t-1} + \delta 3 INFR_{t-1} + e_{1t} \quad \ldots\ldots (2)$$

$$DINFR_t = \alpha_1 + \sum_i^n \beta_3\, DGDP_{t-1} + \sum_i^n \beta_1 DUNR_{t-1} + \sum_i^n \beta_2\, DINFR_{t-1} + \delta 1 GDP_{t-1} + \delta 2 UNR_{t-1} + \delta 3 INFR_{t-1} + e_{3t} \quad \ldots\ldots (3)$$

$$DUNR_t = \alpha_1 + \sum_i^n \beta_3\, DGDP_{t-1} + \sum_i^n \beta_1 DUNR_{t-1} + \sum_i^n \beta_2\, DINFR_{t-1} + \delta 1 GDP_{t-1} + \delta 2 UNR_{t-1} + \delta 3 INFR_{t-1} + e_{2t} \quad \ldots\ldots (4)$$

Where:
D denotes first difference operator
α_1 is the drift component
e_{1t} is the usual white noise Residual?
Co-integration relationship is conducted by testing:

Null hypothesis H_N: $\delta 1 = \delta 2 = \delta 3 = 0$ *against*
Alternative hypothesis H_A: $\delta 1 \neq \delta 2 \neq \delta 3 \neq 0$.

Pesaran et al. (2001) gave critical values in their studies because the critical values of bound test are not consistent with standard *F* distribution. If *F* statistic is above upper critical value, there is cointegration such as Engle and Granger (1987), Johansen (1988) and Johansen and Juselius (1990) which consider the integration levels of time series should be used.

The ARDL has been chosen since it can be applied for a small sample size as it happens in this study. Also, it can estimate the short and long-run dynamic relationships in demand of money simultaneously. The ARDL methodology is relieved of the burden of establishing the order of integration amongst the variables. Furthermore, it can distinguish dependent and explanatory variables, and allows to test for the existence of relationship between the variables. Finally, with the ARDL it is possible that different variables have differing optimal number of lags. Integration relationship among the time series. On the other hand, if *F* statistic is below the lower critical value, there is no co-integration relationship among the variables. Finally, if *F* statistic is between upper and lower critical values, alternative co-integration tests.

3.3. *VECM Granger Causality*

Thus, equation (2,3 and 4) in the ARDL version of the error correction model can be expressed as equation (5,6 and 7): The error correction (ECM) version of ARDL model pertaining to the variables in equation (2-4) is as follows:

$$DGDP_t = \alpha_1 + \sum_i^n \beta_1 DGDP_{t-1} + \sum_i^n \beta_2 DUNR_{t-1} + \sum_i^n \beta_3 DINFR_{t-1} + \varphi 1 EC_{t-1} + u_{1t} \quad (5)$$

$$DINFR_t = \alpha_1 + \sum_i^n \beta_{14} DGDP_{t-1} + \sum_i^n \beta_{24} DUNR_{t-1} + \sum_i^n \beta_{34} DINFR_{t-1} + \varphi 3 EC_{t-1} + u_{3t} \quad (6)$$

$$DUNR_t = \alpha_1 + \sum_i^n \beta_{11} DGDP_{t-1} + \sum_i^n \beta_{22} DUNR_{t-1} + \sum_i^n \beta_{33} DINFR_{t-1} + \varphi 2 EC_{t-1} + u_{2t} \quad (7)$$

Where, α, β_{it} are short run dynamic coefficients to equilibrium and φi is the speed of adjustment coefficient, where residuals, u_{ti} is independently and normally distributed with zero mean and constant variance. n (lag length) in equation (5-6) should firstly be determined while applying bound test. Information criteria are used in the determination of optimal lag lengths. We used Akaike Information Criterion (AIC) and Schwartz Criterion (SC) in determination of optimal lag lengths. Since there is autocorrelation in case of lags, there should be no autocorrelation among the error term series for the bound test to provide accurate results.

Table 1 : VAR Lag Order Selection Criteria

Endogenous variables: GDP INF_RATE UN_RATE						
Exogenous variables: C						
Sample: 1977 2017						
Included observations: 38						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-529.3206	NA	2.95e+08	28.01687	28.14616	28.06287
1	-391.7712	246.1410	341066.9	21.25112	21.76825	21.43511
2	-373.8702	29.20700	215727.5	20.78264	21.68762*	21.10463
3	-359.6161	21.00601*	167798.7*	20.50611*	21.79894	20.96609*
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Source: Authors' calculation using EViews 9

4. EMPIRICAL ANALYSIS.

4.1. Unit Root (Stationarity)Test Result

Unit root analysis is the univariate time series analysis which seeks to find out whether the series are stationary or not. A stochastic process, say is stationary if it has time-invariant first and second moments. In other words, a series of data is stationary if its mean and variance are not time dependent and the covariance does not depend on time, but on the distance in time between the two members of the process (Enders, 2004). The presence of a unit root in the time series representation of a variable has important implications for both the econometric method used and the economic interpretation of the model in which that variable appears. For example, if the time series data is non-stationary, the estimation will either give spurious results or the variables may be related in the long-run. Therefore, it is indispensable that we apply unit root tests before estimation, to see whether the time series data is stationary or not. The model has two styles shown below.

The first shape is equation 2: $Y_t = b_1 + b2t + Zy_{t-1} + a_i + e_t$ (8) (Trend and intercept)

The first shape is equation 3**:** $\Delta Y_t = Zy_{t-1} + a_i + e_t$ (9) (No Trend No intercept

Where b1 is the intercept, t is linear time trend Δ denotes the first difference, and *e* is error term. The null hypothesis is unit root (z=0), and the alternative hypothesis is level stationarity (z <

0). Phillips and Perron (1988, hereafter PP) modified the t-ratio of z coefficient so that serial correlation does not affect the asymptotic distribution of test statistic.

For this purpose, the researcher uses through Augmented Dickey Fuller test (1979) and PP by Philips and Perron (1988). The results have been presented in Tables 1,

Table 1: Result Unit Root Test

	ADF			PP Test		
	LEVEL	1st Diff	1st Diff	LEVEL	1st Diff	1st Diff
	With constant liner trend		No Trend No Intercept	With constant liner trend		No Trend No Intercept
GDP	-1.059505 (0.9224) I(0)	-5.123748 (0.0010)*** I(1)	-1.1662 (0.2176) I(0)	-0.574688 (0.9750) I(0)	-4.539777 (0.0044)*** I(1)	-2.4086 (0.0173)*I (1)
INFR	-5.155981 (0.0008)*** I(1)	-6.966915 (0.0000)*** I(1)	-7.1687 (0.000)*** I(1)	-5.155981 (0.0008)*** I(1)	-21.34097 (0.0000)** I(1)	-19.139 (0.000)*** I(1)
UNR	-3.234154 (0.0936) I(0)	-2.510863 (0.3215) I(0)	-2.300 (0.00220*** I(1)	-2.510120 (0.3218) (I(0)	-2.510120 (0.3218) I(0)	-2.233 (0.0026)*** I(1)

Source: Authors' calculation using EViews 9.

The results in Table 1 shows that testing for the stationarity of the individual variables using ADF and PP test to ascertain the existence of a unit root in each of the time series. ADF and PP test results showed that the variables have different integrating order. So, we continue applying the ARDL bounds test.

4.2. Cointegration Test Result

The co-integration tests in applied time series modelling are the Engel and Granger (1987) co-integration test and the Johansen and Juselius (1990) co-integration test. The Engel & Granger co-integration test is adopted in cases of single equation models while the Johansen and Juselius co-integration test is used for system equation models. The autoregressive distributed lag (ARDL) model is based on single equation modeling.

The results in Table 2 and 3 show that there is co-integration among gross domestic product (GDP), Inflation rate (INFR) and Unemployment Rate(UNR).

Table 2: Cointegration Result. Dependent variable is GDP

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.468975	33.37035	29.79707	0.0186
At most 1	0.181841	8.685478	15.49471	0.3953
At most 2	0.021766	0.858233	3.841466	0.3542

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 3: Cointegration Test Result. Dependent variable is GDP

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.468975	24.68487	21.13162	0.0151
At most 1	0.181841	7.827245	14.26460	0.3965
At most 2	0.021766	0.858233	3.841466	0.3542

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Authors' calculation using EViews 9.

The cointegration results in table 2 and 3, indicate the existing of long run relationship between GDP, INFR and UNR in Kuwait as indicates by the Trace and eigenvalue statistics. The result shows that there are one cointegrating equation at 5 percent level of significance both the maximal Trace and eigenvalue statistics indicate that the hypotheses of no cointegration among the variables is rejected at the 5 percent significance level.

4.3. *ARDL Test Result*

Estimation, and Interpretation of Autoregressive Distributed Lag (ARDL) *Model*

After determining the order of integration, next we employ ARDL approach to co-integration to determine the long run relationship among the variables. The F-Statistics tests the joint Null hypothesis that the coefficients of lagged level variables in equation (2) are zero. Table 4 reports the result of the calculated F-Statistics. The bound test evidence confirms the long run relationship for equation 2 and 3 with GDP and INFR as the dependent variables. As in these cases, the calculated F statistics greater than the critical values of the upper level of the bound at 5 Percent level of significance for equations 2 and 3. We choose a maximum lag order of 3 for the conditional ARDL vector error correction model by using the Akaike information criteria (AIC). The calculated F-statistics are reported in table 4 when each variable is considered as a dependent variable (normalized) in the ARDL-OLS regressions. After having the appropriate lag selection, we move to calculate F-statistics that are r eport ed in table 4. When GDP is taken as dependent variable and INFR and UNR as independent variables, the statistic is 6.217that is greater than the upper. bounds at 5 percent level of significant So, we conclude that there is a long ru n association among the variables.Wereplace independent variable INFR bym aking it dependent tocheckweather UNR and GDP will make long run association. Result shows that F-statistics 8.972 that is greater than the upperbounds at 5 percent level ofsignificant. So, we conclude that there is a long ru nassociation amongthe variables.However,when we take UNR a dependent variable we fail to reject null hypotheses of no cointeration as F-statistics found 2.89.

Table 4: Results from bound tests

Dependant variable	AIC lags	F-statistic	Decision
GDP (GDP, INFR,UNR,)	3	6.217796	Cointegration
INFR (GDP, INFR,UNR,)	3	8.972149	cointegration
UNR (GDP, INFR,UNR,)	3	2.898571	No cointegration
Lower-bound critical value at 5%		3.79	
Upper-bound critical value at 5%		4.85	

Lower and Upper-bound critical values are taken from Pesaran et al. (2001), Table CI(ii) Case II.

Source: Authors' calculation using EViews 9

After confirming the long run relation for the above equations, the next step is to estimate the long run and short run coefficients of ARDL model. The estimated long run coefficient of ARDL approach for the equation with GDP is treated as dependent variable (equation 2) UNR coefficient is positive and significant at 5 percent level of significance. If we check the relation of INFR with GDP, it has negative and not significant relation with the GDP in the long run .If we check the relation INFR as the dependent variable with GDP and UNR as independent variables, it has positive and not significant relation having coefficient 0.000002 and 0.699 respectively (equation 3),when UNR as the dependent variables and GDP and INFR as independent variables (equation 4) are presented in table 5 .GDP coefficient is positive and significant at 5 percent level of significance having coefficient (0.000028) and UNR coefficient is positive and statistically not significant at 5 percent level of significance having coefficient (0.029).

Unlike many studies where the relationship is strong and negative, in this study empirical results are not robust. The absence of a statistically significant relation between UNR and GDP indicates that a cyclical recovery is not accompanied by a reduction of unemployment. Furthermore, this might reflect the sizable structural and/or frictional component of unemployment in Kuwait.

Table 5: Estimation of long and short-run relationship

equation 2: Dependent Variable: GDP

Variable	Coefficient	t-Statistic	Prob.
Constant	-9128.568341	-0.584509	0.5639
INFR	-7093.939245	-1.368755	0.1828
UNR	13031.76874	2.132470	0.0426*
*Cointeq : GDP = (-7093.9392*INFR + 13031.7688*UNR*			

Equation 3: Dependent variable: INFR

Variable	Coefficient	t-Statistic	Prob.
Constant	0.486297	1.768217	0.7851
UNR	0.699954	1.065065	0.5158
GDP	0.000002	0.000046	0.9657
*Cointeq : INFR =(0.7000*UNR + 0.0000*GDP + 0.4863*			

Equation 4: Dependent variable: UNR

Variable	Coefficient	t-Statistic	Prob.
Constant	1.623170	6.492580	0.0000
GDP	0.000028	2.401426	0.0227*
INFR	0.029383	0.6828	0.412676
*Cointeq : UNR = 0.0000*GDP + 0.0294*INFR + 1.6232*			

Source: Authors' calculation using EViews 9.

Table 6: Error Correction Representation for the selected ARDL Model

Equation 5: : dependent variable is GDP				Equation 6: : dependent variable is INFR			
Variable	Coefficient	t-Statistic	**P-value**	Variable	Coefficient	t-Statistic	p-value
D(GDP(-1))	0.247262	1.437895	0.1624				
D(GDP(-2))	-0.336769	-1.890485	0.0699				
D(INF_RATE)	292.035674	1.811429	0.0816				
D(INF_RATE(-1))	-145.677532	-0.846894	0.4048				
D(INF_RATE(-2))	-354.566759	-2.183610	0.0382				
D(UN_RATE)	13157.781347	2.991749	0.0060	D(INFR(-1))	0.256804	1.550654	0.1308
D(UN_RATE(-1))	5226.111229	0.721637	0.4770	D(UNR)	8.565237	2.636451	0.0128
D(UN_RATE(-2))	9155.041834	-2.147252	0.0413	D(GDP)	0.000002	0.043367	0.9657
CointEq(-1)	0.105925	1.632334	0.1147	CointEq(-1)	-1.138235	-5.062912	0.0000

Source: Authors' calculation using EViews 9.

Table 7: Error Correction Representation for the selected ARDL Model

Equation 7: : Dependent Variable: UNR				
ARDL Cointegrating And Long Run Form				
Dependent Variable: UNR				
Selected Model: ARDL(3, 1, 0)				
Sample: 1977 2016				
Included observations: 37				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UNR(-1))	0.319855	0.147489	2.168668	0.0382
D(UNR(-2))	0.457707	0.147717	3.098543	0.0042
D(GDP)	0.000017	0.000005	3.215844	0.0031
D(INFR)	0.002597	0.006143	0.422788	0.6755
CointEq(-1)	-0.088388	0.049651	-1.780195	0.0852

Source: Authors' calculation using EViews 9.

The error correction model (ECM) is employed to check the short run relationship among the variables. The results are presented in Table 6 and 7 for the estimated equation 5, 6 and 7. equation 5 results show that the coefficient of ECM (-1) is not significant at 5% level which indicate that the speed of adjustment for short run to reach long run is not significant in equation 5,while equation 6 results show that the coefficient of ECM (-1) is significant at 1 percent level which indicate that the speed of adjustment for short run to reach long run is significant represent 113.8 percent per year.. For equation 7, the coefficient of ECM (-1) is significant at 10 percent level which indicate that the speed of adjustment for short run to reach long run is good. Further, the error correction term is -0.088 with expected sign, suggesting that when the UNR is above or below its equilibrium level, it adjusts by almost 8.83 percent per year.

4.4. *VECM Granger-Causality Result*

After the long-run relationship, we continue applying the VECM to determine the direction of causality between the examined variables. The equations that are used to test Granger causality .as can be seen from table 7, the EC_{t-1} carries an expected negative sign, which is highly significant, indicating that the absolute value of the coefficient of the error correction term indicates that about 80 percent of the disequilibrium in the GDP is offset by short run adjustment in each year.

Table7 : Vector Error Correction Model (VECM)

Dependent Variable: D(RGDP_G_)				
Method: Least Squares (Gauss-Newton / Marquardt steps)				
Sample (adjusted): 1980 2016				
Included observations: 37 after adjustments				
D(RGDP_G_) = C(1)*(RGDP_G_(-1) + 0.0436990438472				
*UN_RATE___OF_ECONOMIC ALL (-1) - 0.366520710897				
*INF_RATE__(-1) - 3.32440331147) + C(2)*D(RGDP_G_(-1)) + C(3)				
*D(RGDP_G_(-2)) + C(4)*D(UN_RATE___OF_ECONOMICALL(-1)) +				
C(5)*D(UN_RATE___OF_ECONOMICALL(-2)) + C(6)*D(INF_RATE__(				
-1)) + C(7)*D(INF_RATE__(-2)) + C(8)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.800873	0.233507	-3.429767	0.0018
C(2)	0.091380	0.200321	0.456167	0.6517
C(3)	-0.081111	0.173665	-0.467056	0.6439
C(4)	-0.228071	0.686753	-0.332101	0.7422
C(5)	-0.318678	0.680466	-0.468323	0.6431
C(6)	-0.197811	0.207017	-0.955533	0.3472
C(7)	-0.168030	0.186056	-0.903113	0.3739
C(8)	0.121220	0.620564	0.195338	0.8465
R-squared	0.440763	Mean dependent var		0.197297
Adjusted R-squared	0.305775	S.D. dependent var		4.444815
S.E. of regression	3.703428	Akaike info criterion		5.645205
Sum squared resid	397.7460	Schwarz criterion		5.993512
Log likelihood	-96.43629	Hannan-Quinn criter.		5.767999
Durbin-Watson stat	1.794203			

Source: Authors' calculation using EViews 9.

The Granger causality results are reported below in Table 8. The findings indicate that short-run unidirectional causality running from UNR to INFR It has been found that the error correction terms are statistically significant for the specification INFR as the dependent variables which indicate that there exists a short run relationship among the variables in the form of Equation (6) as well as equation (7).

Table 8: VECM Granger Causality Test Results

Pairwise Granger Causality Tests			
Sample: 1977 2017			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
INFR does not Granger Cause GDP	39	0.68874	0.5091
GDP does not Granger Cause INFR		1.59618	0.2175
UNR does not Granger Cause GDP	39	0.12415	0.8836
GDP does not Granger Cause UNR		0.92088	0.4079
UNR does not Granger Cause INFR	39	4.05068	0.0264
INFR does not Granger Cause UNR		0.95337	0.3955

Source: Authors' calculation using EViews 9.

Diagnostic tests are applied to examine model specification and functional forms.The Lagrange Multiplier (LM) test of autocorrelation suggests that the residuals are not serially correlated. According to the Jarque-Bera (JB) test, the null hypothesis of normally distributed residuals cannot be rejected. The White heteroscedasticity test suggest that the disturbance term in the equation is homoscedastic. and the null of homoscedasticity test ARCH is not rejected. (See Appendix A: tables 5, 6,7,8 and Figure 1).

4.5. Stability (CUSUM and CUSUMSQ) Test

The stability of the long-run coefficients is used to form the error-correction term in conjunction with the short run dynamics. Some of the problems of instability could stem from inadequate modeling of the short-run dynamics characterizing departures from the long run relationship. Hence, it is expedient to incorporate the short run dynamics for constancy of long run parameters. In view of this we apply the CUSUM and CUSUMSQ tests Brown et al. (1975) developed. The CUSUM test is based on the cumulative sum of recursive residuals based on the first set of n observations. It is updated recursively and is plotted against the break points. If the plot of CUSUM statistic stays within 5% significance level, then estimated coefficients are said to be stable. Similar procedure is used to carry out the CUSUMSQ that is based on the squared recursive residuals which A graphical presentation of these two tests is provided in Figures.1- 2.

The result in Figure 1 and 2 clearly indicates that the model has been stable. We are therefore safe to conclude that ARDL economic growth function is stable and economic growth can be used as a target variable.

Figure 1: Figure 1: Plot of Cumulative Sum of Recursive Residuals

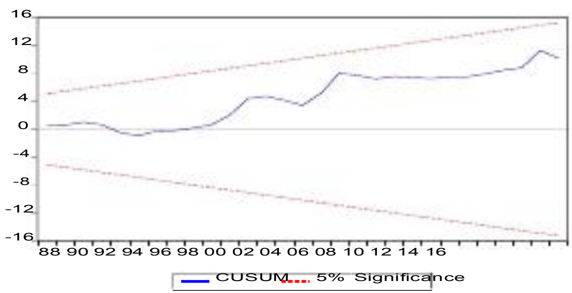
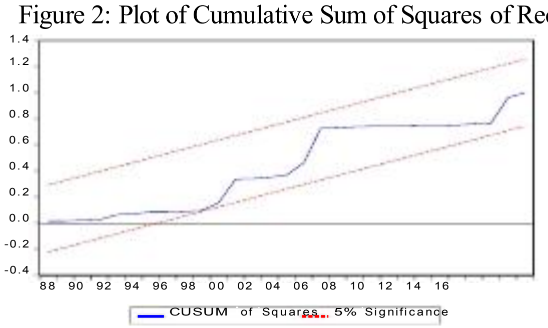


Figure 2: Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

5. CONCLUSION AND POLICY IMPLICATIONS

In this study, the impact of inflation (INFR) and unemployment (UNR) on economic growth (GDP) in Kuwait has been estimated using ARDL approach to cointegration analysis of Perasan et al. (2001). The ARDL method does not generally require knowledge of the order of integration of variables. The empirical results have shown that, most of the variables in the model are statistically significant and consistent with the economic theory both in the long-run as well as in the short-run.

The empirical analysis based on the bounds test, supports the stable economic growth model (GDP) for Kuwait. In fact, we show that the existence of the long-run economic growth equation can only be firmly established when inflation rate and unemployment rate and GDP are included in the model.

The results reveal that GDP is negatively associated with inflation rate. This indicates that as inflation rate rises, the GDP falls, and positively associated with unemployment rate and statistically significant at 5 percent level of significance when GDP as a dependent variable. And inflation rate positively associated with GDP and unemployment when inflation rate as a dependent variable and statistically not significant at 5 percent level of significance. While when the Unemployment rate dependent variable associated positively with GDP and Inflation rate and statistically significant with GDP at 5 percent level of significance.

Furthermore, by applying the CUSUM and CUSUMSQ tests to the model, we show that GDP in Kuwait has been stable apart from between 1992 and 1995. By incorporating CUSUM and CUSUMSQ tests into cointegration analysis, it is revealed that GDP is stable,

The Granger causality test results supported the existence of unidirectional short-run causal relationship from unemployment rate to inflation rate. It was found that the error correction terms in VECM are statistically significant when GDP and inflation rate were taken as the dependent variable but insignificant when unemployment rate was taking as dependent variable. This indicates the existence of a long-run relationship among the variables with GDP and Inflation rate as dependent variable.

The above literature reviews show that inflation is vary form economy to economy but most of the studies indicate that there is a positive relationship between inflation and economic growth. On the other hand, the above literature reviews showed that there is a negative relationship between unemployment and economic growth. However, cohesion and strength of these effects were highly variable in different studies according to used model and data. It should be noted that the effects of inflation and unemployment on economic growth were extraordinary extensive, particularly the effects of inflation. Most studies showed a nonlinear and direct relationship between inflation and economic growth. Thereby, it can be stated that inflation and unemployment are two main factors affecting economic growth. As a result, authorities should pay more attention to importance of inflation and unemployment in economic growth. The authorities should diligently endeavor to properly plan for economic progress and development.

REFERENCES

Aminu U. and Manu D., 2014, 'The growth effects of unemployed resources and inflation in Nigeria', Journal of Economics and Sustainable Development, 5, 2

Balami, D.H., 2006, Macroeconomic Theory and Practice, Salawe prints, Off Leventies, Wulari, Maiduguri.

Brown RL,Durbin J,Evens JM (1975) Techniques for testing the constancy or Regression relationships over time.J R Stat Soc Ser B:37:149e92.

Dickey DA, Fuller WA (1997) Distribution of the estoimqators for Autoregressive time series with a unit root J Am Stat Assoc;74:427e31.

Dickey DA, Fuller WA. (1981) Likelihood ration statistics for autoregressive time se-ries with a unit root.Econometrica; 49:1057e7.

Engle RF,Granger CW (1987), Cointegration and Ecrror correctionrepresentation: estimation and testing Econometrica 1: 55:251e76.

Friedman, M., 1976, *Inflation and Unemployment- Nobel Memorial Lecture,* The University of Chicago,Illinois, USA.

Umaru, A., & Zubairu, A. A. (2012). Effect of Inflation on the Growth and Development of the Nigerian Economy: An Empirical Analysis. *International Journal of Business and Social Science, 3 (10).*

Hussain, T., Siddiqi, M. W., & Iqbal, A. (2010). A Coherent Relationship between Economic Growth and Unemployment: An Empirical Evidence from Pakistan. *International Journal of Human and Social Sciences,* 5(5), 332-339.

Kreishan, F.M., 2010. Economic growth and unemployment: An empirical analysis. Journal of Social Sciences, 7(2): 228-231.

Mahmoud Ali J. (2013). Impact of inflation and unemployment on Jordanian GDP. Retrieved from http://journal-archieves28.webs.com/317-334.

Mehrnoosh M and Feizolah J(2016) Examining the Effects of Inflation and Unemployment on Economic Growth in Iran (1996-2012). Procedia Economics and Finance 36 (2016) 381 – 389

Mohsenia M| and Jouzeryanm, F (2016)"Examining the effects of inflation, unemployment on economic growth in Iran.Procedia Economics and Finance,36, pp.381-389.

Pesaran, H.M. and Shin, Y. (1999), An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis, in storm, S. (Ed), Econometrics and Economic Theory in the 20th century, the ranger Frish Centennial symposium, Cambridge University Press.

Persaran, H.M., Shin, Y and Smith, J. (2001), Bound Testing Approaches to the Analysis of Level Relationships" Journal of Applied Econometrics.

Pesran M, Pesaran B (1997) Working with Microfit 4.0: interactive economic analysis. Oxford: Oxford University Press.

Omeke, P.C. and C.U. Ugwunyi, 2010, 'Money, Price and Output: A Causality Test for Nigeria', American Journal of Scientific Research, 8, pp. 78-87. Euro Journals Publishing, Inc.

Johansen S (1988) Statistical analysis of cointegrating vectors. J Econ Dyn Control;:12:231e54.

Johansen S, Juselius K.(1990) Maximum likelihood estimation and influence on cointegration with application to the demand for money.Oxf.Bull.Econ Stat:52:169 e210.

Jhingan, M. L., 2003, *Advanced Macroeconomic Theory 11h Edition.* Delhi: Vrinda Publications (P) LTD.

Kreishan, f. (2011) Economic Growth and Unemployment: An Empirical Analysis, Journal of Social Sciences, 7, 2, 228-231.

Laurence son J,Chai J (2003) Financial reform and economic development in China UK: Edward Elgar, Cheltenham.

Umar A. and Zubairu A.A., 2012, 'Effect of inflation on the growth and development of the Nigerian economy; An empirical analysis', *Internal journal of Business and Social Science,* 3, 10.

Yelya, M.David and Awe EO (2015)"Analysis of the relationship between Inflation, unemployment and economic growth in Nigreia.:1987-2012.Applied Economics and Finance 2(3).IMF,2016.:http://www.imfo.org/external/pups/ft/weo/2016/02/weodata/weose.Igr.aspx

Shahid, M. (2014) study on the impact of inflation and unemployment on the economic growth of Pakistan via the ARDL model approach. International Journal of Developing and Emerging Economies Vol.5, No.1, pp.26-39, April 2017 Published by European Centre for Research Training and Development UK (www.eajournals.org) 28 ISSN 2055-608X(Print), ISSN 2055-6098(Online) In line with the above

APPENDIX A

Table 5: ARDL Cointegrating And Long Run Form

Dependent Variable: UNR				
Selected Model: ARDL(3, 1, 0)				
Date: 05/15/17 Time: 00:06				
Sample: 1977 2016				
Included observations: 37				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UNR(-1))	0.319855	0.147489	2.168668	0.0382
D(UNR(-2))	0.457707	0.147717	3.098543	0.0042
D(GDP)	0.000017	0.000005	3.215844	0.0031
D(INFR)	0.002597	0.006143	0.422788	0.6755
CointEq(-1)	-0.088388	0.049651	-1.780195	0.0852
Cointeq = UNR - (0.0000*GDP + 0.0294*INFR + 1.6232)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.000028	0.000012	2.401426	0.0227
INFR	0.029383	0.071202	0.412676	0.6828
C	1.623170	0.250004	6.492580	0.0000

Table 6: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.600655	Prob. F(2,24)	0.5565
Obs*R-squared	1.811404	Prob. Chi-Square(2)	0.4043

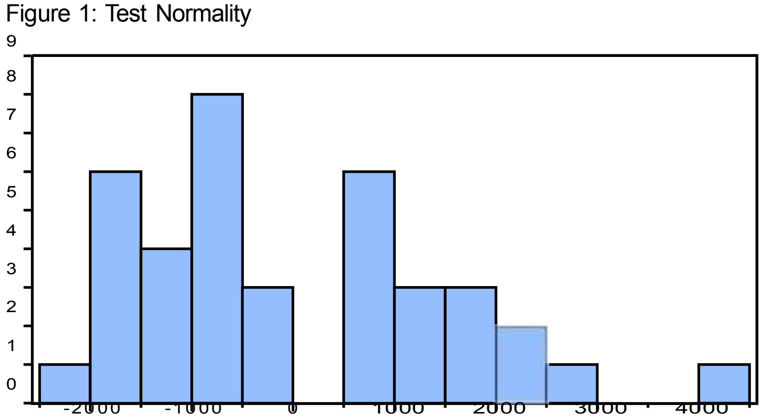
Table 7: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.554465	Prob. F(11,26)	0.8471
Obs*R-squared	7.220340	Prob. Chi-Square(11)	0.7810
Scaled explained SS	3.069139	Prob. Chi-Square(11)	0.9898

Table 8: Heteroskedasticity Test: ARCH

F-statistic	0.035223	Prob. F(1,35)	0.8522
Obs*R-squared	0.037198	Prob. Chi-Square(1)	0.8471

Figure 1: Test Normality



Series: Residuals	
Sample 1980 2017	
Observations 38	
Mean	-1.23e-11
Median	-513.3547
Maximum	4133.665
Minimum	-2126.265
Std. Dev.	1499.058
Skewness	0.661607
Kurtosis	2.815973
Jarque-Bera	2.825873
Probability	0.243427