

PUBLIC SECTOR WAGE AND INFLATION IN GHANA



**Grace
Ofori-Abebrese¹
George Kwesi
Walanyo Azumah²
Robert Becker
Pickson³⁺**

*^{1,2}Department of Economics, Kwame Nkrumah University of Science
and Technology, Kumasi, Ghana*

*³College of Economics and Management, Sichuan Agricultural
University, Chengdu, China*



(+ Corresponding author)

ABSTRACT

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Achieving price stability has been in the orbit of concern of state authorities for time immemorial. This paper is therefore focused on determining empirically the impact of public wage bill on inflation in Ghana for the period of 1986-2014. Using an Autoregressive Distributed Lag (ARDL) to cointegration model, it was discovered from the study that public wage bill, currency depreciation rate, money supply, and fiscal deficit all have significant impact on inflation in Ghana. The outcome of this study postulates that the rate of inflation determination in Ghana is also a fiscal phenomenon in spite of the significant and domineering role played by monetary expansion. Consequently, equal attention must be accorded both fiscal and monetary policy in the fight against the rate of inflation in Ghana for appreciable and sustained result.

Contribution/ Originality: The present study is one of very few studies which have empirically investigated the impact of public sector wage on the rate of inflation in Ghana. The primary contribution of this study is to draw policy makers' attention to the fact that the rate of inflation determination is also fiscal phenomenon despite the significant and domineering role played by monetary expansion.

1. INTRODUCTION

High wage bill and continuous increase in the rate of inflation have been a great national concern over the years. The situation has become alarming in recent times sparking a lot of debates among researchers, policy analyst, academicians, politicians and the public at large concerning the causes and the link between these important macro variables. Friedman (1968) in his quantity theory of money quoted by Ekanayake (2012) indicated that “inflation is always and everywhere a monetary phenomenon,” others believe there are fiscal theories that explain inflation. This suggests that inflation is not only a monetary phenomenon. For instance, Bawumia and Abradu-Otoo (2003) argued that there are other vital factors that determine inflation in Ghana in spite of the significant role played by monetary expansions. They found wages, fiscal policies, exchange rate depreciation, oil prices, and food supply among others

as other important sources of inflation in Ghana. Similarly, a study by Sowa (1994) cited in Metin (1998) revealed that inflation in Ghana is influenced more by output volatility than by monetary factors both in the short run and in the long run. In Metin (1998) fiscal expansion was a determining factor for inflation in Turkey. Again, Dogas (1992) found that public deficit affects inflation in Turkey, and Choudhary and Parai (1991) in their work also found that budget deficits as well as money supply growth rate have a significant impact on inflation in Metin (1998).

According to the Ministry of Finance (2013) the wage bill has more than tripled over the period 2009- 2012. It increased from GH¢2.9b (\$2.58b) in 2009 representing 62% of tax revenue to GH¢9b (\$5b) in 2012. The 2012 wage bill forms 73% of tax revenue including salary arrears, 40.8% of total expenditure and 11.9% of GDP. International Monetary Fund (2005) also noted that Ghana's wage bill as a percentage of GDP is higher than the average wage bill in Sub-Sahara Africa between 2000-2004 and higher than that of ECOWAS between 1990- 2004. Inflation has also been on the ascendancy and continues to fluctuate rising from 10.9% in 2007 to 16.5% in 2008 and 19.3% in 2009 and stands at 17% at the end of 2014.

It is undeniable fact, and clear that Ghana's public sector wage bill constitutes the highest proportion of its expenditure in recent years. If an increase in government expenditure can lead to an increase in aggregate demand raising price levels with its attendant implications on the private sector, then increase in wages should be a great concern. But the emphasis in Ghana has always been on the use of monetary measures without giving fiscal measures of which wage is one much consideration. That is to say, the aggregate price level and price inflation targeting (fixing price to effect movements in the interest rate) has received much attention but the aggregate wage rate and wage inflation targeting (rule that makes interest rate responds only to wage movements) which is an obvious alternative has received almost no attention (Canzoneri *et al.*, 2004).

After several measures like increase in the Bank of Ghana's prime rate, contraction in money supply, etc. to stabilize price levels, no permanent results have been achieved. Some proponents and theories have advocated for the use of some measures to solve the problem with no regards to the role of wage hikes. One of such theories is Friedman (1968) quantity theory of money cited in Ekanayake (2012) that explains inflation phenomenon as a result of too much money chasing too few goods. The monetarists approach tags a unique price level inflation as, always, and everywhere, a monetary phenomenon which emanates from a rise in money supply. This is in variance with Keynes theory that, prices increase over any increase in production in the absence of excess demand in the market due to the existence of pressure from organized labour unions for increased wages. The employers resolve to transfer the increased wages into prices culminating into wage-price spiral, which triggers inflation relating also to the cost-push school of thought. Thus, contrary to the monetarists' view, Keynes and the Structuralists affirm that inflation is not as a result of increased money supply but increase in wages, increase in import prices, increase in commodity prices, exchange rate effects etc.

A critical question that must be asked is whether high wages increase price levels in Ghana? To provide answer to this question, there is, therefore, the need to investigate empirically if the recent distending in public sector wage bill has any hand in the inflation rate volatility in Ghana.

2. RELATED LITERATURE REVIEW

Most Economists have debated the extent to which inflation is a monetary phenomenon. Prominent is the Classical economics that emerged in modern forms one of which is monetarism. Monetarists reject the fiscal policy as stabilization tool on grounds of its weakness and the crowding-out effect. They hold the view that changes in money supply is the single most important determining factor of the levels of output, employment, and price levels (Campbell and Stanley, 1996). This argument is supported by Barro (1989) who claims that a rise in budget deficit does not impact on aggregate demand, interest rate, and price level. Monetarism maintained that the price and wage flexibility offered by the competitive markets would generate fluctuations in aggregate demand to change the product and resource prices rather than output and employment. They argued against government interference in the economy

that it has contributed to the instability of the system to the business cycle through its clumsy and mistaken attempts to achieve greater stability through discretionary fiscal and monetary policy.

In relation to the Keynesians, the market system is insufficiently competitive and flexible to guarantee macroeconomic stability. Keynes asserts that because government spending such as wages is a component of aggregate expenditures and tax changes have dependable effects on consumption and investment, fiscal policy is a powerful and active stabilization instrument. Keynes position is maintained by other proponents of fiscal theory of inflation such as [Sargent and Wallace \(1981\)](#) in [Ekanayake \(2012\)](#) who suggest that inflation is at least partially determined by the budgetary policies of the fiscal authority and that long-run price stability is not completely within the purview of the monetary authority. This view is also contended by [Carlstrom and Fuerst \(2000\)](#); [Leeper \(1991\)](#); [Sims \(1994\)](#) and [Woodford \(1994;1995\)](#) cited by [Ekanayake \(2012\)](#). The core information of these works is that the price level is determined purely by fiscal variables i.e. government debt, present and future revenue and spending plans, and monetary factors play no role in determining the price level.

The Keynesian theory of inflation revealed that when organized institutional forces of trade unions press for higher wages, in the absence of excess demand in the economy, prices increase in excess of any increase in production. This is also to say that in the presence of excess demand prices go up avowing the demand-pull school of thought. In another vein, employers translate the increased wages into prices which lead to the wage-price spiral affirming the cost-push school of thought. Thus, the level of money wage rate imposes a momentous influence on the level of costs which in turn determines the short run price levels.

Numerous empirical studies have been carried out on the determinants of inflation. For instance, [Mwase \(2006\)](#) used a Structural Vector Auto Regression (SVAR) model and a dataset from 1990 to 2000 to assess the effects of exchange rate changes on consumer price in Tanzania. The study suggested that, in spite of currency depreciation, there was a decline in the exchange rate pass-through to inflation in the later part of 1990. This decline is, however, linked to the implementation of structural and monetary reforms during the period and does not imply less significant fluctuations in the exchange rate in interpreting macroeconomic volatilities.

[Milhajak and Saxena \(2009\)](#) also conducted a study on wages, productivity and structural inflation in emerging market economies. They employed an analytical framework considering a simple aggregate model of the economy with Cobb-Douglas constant- returns to scale production function. They found out that wages adjust for inflation revealing positive correlations. A significant correlation between inflation and wage growth was discovered in Chile, China, Czech Republic, Hong Kong, Philippines, and Thailand. Also, except in Brazil, South Africa, Korea and China, there was an observation of a close alignment of average growth rates of labour productivity and real wages in most emerging market economies. They found a faster growth in real wages in these countries than average growth of labour productivity. The implication of this is that the labour market of these economies produces increasing real unit labour costs, hence increasing inflation.

[Kashif \(2011\)](#) studied the long run relationship between inflation and exchange rates in Pakistan using Ordinary Least Square (OLS) model and a monthly data from 1970-2009. He considered inflation as the explanatory variable and the exchange rate as the explained variable per contemporary study. The study maintained that there is a strong negative correlation between inflation and exchange rate. This finding may suggest and render invalid the argument of imported inflation. He also found that a rise or fall in the value of a currency is caused by the macroeconomic variables such as the interest rates, monetary policy and inflation. In effect, changes in spot and forward exchange rates are the results of changes in inflation.

[Alison \(2011\)](#) outlined in a panel regression results that the relationship between monetary union and high levels of wage inflation in the public sector, relative to the manufacturing sector is statistically significant. The study exposed the conventional view suggesting that inflation and fiscal deficits are worsened due to public sector unions' agitation for wage increases, which does not reflect in their productivity since the provision of essential and price inelastic services are monopolized by the public sector. This conventional view is challenged by [Alison \(2011\)](#)

arguing that it is the accidental effect of the institutional movements towards European Economic and Monetary Union (EMU) that cause the recent public sector wage inflation increase in relation to what occurs in the manufacturing sector in the Euro-countries. This occurs as public employer's capability to deny inflationary wage payments to public workers is weakened by the removal of some constraints by these unions. [Alison \(2011\)](#) further noticed that public sector wage inflation was curtailed during the pre-EMU regimes i.e. under their predecessors, the European Monetary System (EMS). He found that an increase in public sector wage generates inflation which he described as public sector wage inflation. He, therefore, suggests a limit to public sector wage rise by governments to avoid excess expenditure that translates into inflation.

[Ekanayake \(2012\)](#) examined the validity of the hypothesis which suggests there is a connection between fiscal deficit and inflation in less developed countries and explored further such connection in the absence of public sector wage. Using an Autoregressive Distributed Lag (ARDL) in his analysis of annual data from 1959 to 2008 in Sri Lanka, with a persistent fiscal deficit and rising inflation with large public sector found that there is a positive correlation between fiscal deficit and inflation. He noted that a one percent rise in the ratio of fiscal deficit to narrow money results in about eleven percent increase in inflation. It was further found that this relationship becomes weaker in the absence of public sector wage expenditure.

According to the work of [Perry and Cline \(2013\)](#) using a vector autoregressive technique and a deduction from the Post-Keynesian identification strategy and structuralist theories of inflation, there is a positive correlation between the rate of inflation and inflation volatility and wages in the US. They argued that basically, a fall in inflation rate and inflation volatility was as a result of a fall in wages and deteriorating import prices triggered by international competition and exchange rate effects. They supported this argument that a fall in inflation has been a wage and import price moderation using graphical analysis, impulse response functions and variance decomposition. They went further to argue for the wage-price spiral suggesting that inflation generally is due mainly to the wage pressure on costs. They also found exchange rates volatility not due to inflation as the only basic causal factor. Inflation can be affected by exchange rates effects first i.e. the pass-through effects before exchange rates can be affected by inflation in the model. They concluded from their empirical results that a clear positive increase in inflation results from a positive increase in wages and that after import prices, wages have the second magnitude effect on inflation.

With regards to Ghana, [Bawumia and Abradu-Otoo \(2003\)](#) employed monthly data series covering the period of 1983-1999 in an attempt to ascertain the relationship between money growth, inflation, and exchange rate. They used an error-correction mechanism and cointegration analysis. The results of the study suggested a long run relationship between inflation, money supply growth cedi depreciation and real income. It was also found that there is a positive correlation between exchange rate, and money supply growth and inflation in Ghana but found inflation to be inversely related to real income.

Using Structural Vector Auto-Regressive (SVAR) model, [Sanusi \(2010\)](#) estimated the pass-through effects of exchange rate to consumer prices in Ghana. The study found that a vital source of inflation in Ghana is the depreciation of the exchange rate. The study, however, revealed that, in explaining the actual inflationary pressures in Ghana, monetary expansion has been more domineering than the exchange rate depreciation drawing from variance decomposition analysis.

The [West African Monetary Zone \(WAMZ\) \(2012\)](#) conducted a research in the WAMZ countries to investigate the impact of the effects of exchange rate changes on growth in output and inflation using a Vector Autoregressive (VAR) model. The paper used quarterly data series covering the period 1981Q1-2010Q4 for all countries except Ghana and Guinea. It covered the period 1983Q2 to 2012Q4 for Ghana and 1989Q1 to 2010Q4 for Guinea. Evidence from the study justified that in all member countries, the exchange rate had a significant impact on inflation. For Liberia and Sierra Leone, an inverse correlation between real exchange rate and real output growth was obtained by the study. This suggested that real exchange rate depreciation in both countries could result in output growth.

However, in Ghana, Nigeria, Gambia and Guinea, the study maintained a weak positive relationship, something the paper attributes partly to supply side factors.

3. STUDY METHODOLOGY

3.1. Model Specification

Drawing from the Post-Keynesian pricing model of [Perry and Cline \(2013\)](#) the empirical model of inflation for Ghana is constructed as below.

$$\ln INF_t = \alpha_0 + \alpha_1 \ln PWB_t + \alpha_2 \ln EXRDEP_t + \alpha_3 \ln M_t^s + \alpha_4 \ln GFD_t + \alpha_5 \ln PWBE_t + u_t \dots (1)$$

where INF= Inflation rate which is Ghana's general consumer price levels; EXRDEP= Exchange rate depreciation rate of the cedi; PWB= Public sector wage bill as a percentage of GDP; PWBE= Public sector wage bill as a percentage of total government expenditure; INT= Interest rate representing the monetary policy rate; M^s = Money supply which is the broad money (M2+); GFD= Government fiscal deficit; α_0 = Constant intercept; and u_t = Stochastic error term that captures all relevant potential variables that were omitted from the model. $\alpha_1, \alpha_2, \alpha_3, \alpha_4,$ and α_5 are the parameter elasticity coefficients.

3.2. Type and Sources of Data

Secondary data covering the period 1986-2014 were used for the study. The sample period chosen for the study was based on the availability of data for all the variables. Annually collated time series data on inflation, interest rate, money supply and exchange rate depreciation were obtained from Bank of Ghana database. Public sector wage bill was acquired from various issues of the State of Ghanaian Economy (ISSER) and the IMF, government expenditure, and fiscal deficits were calculated from the Ministry of Finance data by the Institute of Economic Affairs (IEA) and the International Monetary Fund (IMF).

3.3. Variables Definition and Expected Signs

After specifying the inflation model for the study, the variables used in the model were defined, and their measurements and expected signs explored under this section. Inflation (INF) used in this study represents the general consumer price index (CPI). To assess the effects, inflation is regressed on macroeconomic variables below.

Public sector wage bill-GDP (PWB) is the total government expenses on wages and salaries only in cash expressed as percentage of GDP. This is based on the [World Bank \(2007\)](#) narrow definition. The wages and salaries are government total remuneration in cash and in kind, and social contributions paid on behalf of employees as captured by [International Monetary Fund Government Finance Statistics Division \(2001\)](#) and [OECD \(2011\)](#). The public wage bill used in the study combines both definitions as the data is obtained from different sources. Public wage bill as a percentage of GDP (PWB) is used because it grows in proportion to GDP. The wage bill is expected to relate positively to inflation drawing from the Post-Keynesian simple pricing model.

Public sector wage bill as a percentage of total government expenditure (PWBE) is also used as independent control variable. It is expected to similar intuitions as public sector wage bill-GDP.

Government fiscal deficit (GFD) is defined as the convention budget deficit ([Dovina et al., 2002](#)). This provides the deficits in positive or absolute values which enable the application of log transformation to all the variables in the model. Fiscal deficit is expected to have a long run and short run inflationary tendencies as observed in Lipsey's fiscal theory of inflation depending on the mode of financing the deficit.

Interest rate (INT) is also an independent variable which represents the Bank of Ghana (BoG) policy rate. An increase in the interest rate is supposed to cause a decline in the rate of inflation; hence a negative relationship based on the simple theoretical monetary model.

Money supply (M^S) is the broad money (M2+) as defined by Bank of Ghana. Also, per the simple theoretical monetary model, an increase in money supply results in an increase in the inflation rate hence, a positive correlation. This is also in line with the monetarists' theory of inflation.

Lastly, exchange rate depreciation (EXRDEP) is assumed to be the depreciation rate of the cedi in this study. The real effective exchange rate is the measure of the relative strength of the domestic currency against a basket of other foreign currencies. This provides a uniform measure of change in exchange rate in all countries irrespective of the choice of the exchange rate regime. However, as this study is concerned with the volatility in exchange rate, depreciation rate is rather chosen. According to the Post-Keynesian pricing model and the monetary model of determining exchange rate, inflation and exchange rate are expected to relate positively.

3.4. Estimation Techniques

Augmented Dickey-Fuller (ADF) was adopted to ensure the reliability of analyzing the study by examining the stationary properties of the variables in question so as to avoid biased, spurious and misleading outcomes. Also, in analyzing the long run correlation between inflation rate and the exogenous variables, the Autoregressive Distributed Lag (ARDL) bounds test was employed. The choice of the ARDL model is based on its efficiency in small sample size as in this study (29 observations) and the possibility of the variables having a different optimum number of lags. The ARDL also allows for cointegration estimation by the use of the Ordinary Least Square (OLS) after identifying the lag of the model (Pesaran *et al.*, 2001). In testing the long run correlation between inflation and the independent variables, the bounds test procedure was applied for cointegration by estimating the following conditional (restricted) version of the ARDL model.

$$\Delta \ln INF_t = \varphi_0 + \gamma_1 \ln INF_{t-1} + \gamma_2 \ln PWB_{t-1} + \gamma_3 \ln EXRDEP_{t-1} + \gamma_4 M^S_{t-1} + \gamma_5 \ln GFD_{t-1} + \gamma_6 \ln PWBE_{t-1} + \sum_{i=1}^p \varphi_{1i} \Delta \ln INF_{t-i} + \sum_{j=1}^q \varphi_{2j} \Delta \ln PWB_{t-j} + \sum_{k=1}^q \varphi_{3k} \Delta \ln EXRDEP_{t-k} + \sum_{l=1}^q \varphi_{4l} \Delta \ln M^S_{t-l} + \sum_{m=1}^q \varphi_{5m} \Delta \ln GFD_{t-m} + \sum_{n=1}^q \varphi_{6n} \Delta \ln PWBE_{t-n} + u_t \dots \dots \dots (2)$$

where φ_i on the difference of the independent variables are the short run multipliers/ dynamics of the model to be estimated through the ECM while γ_i denotes the long run multipliers. The term, φ_0 is the drift/constant and u_t is the error term.

There are three (3) steps involved in the ARDL bound test procedure; The first step is testing for the presence of long run relationship among the variables by estimating equation (2) by the OLS. In so doing, F-Test is conducted for the joint significance of the numerical values of the lagged levels of the variables.

It is hypothesized that;

$$H_0 : \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = 0 \text{ (not cointegrated/no long run effect or relationship)}$$

$$H_1 : \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 \neq 0$$

A test for cointegration is provided by two asymptotic critical values where the independent variables are I (d) (where $0 \leq d \leq 1$). The explanatory variables are assumed to be integrated of order zero, I(0) by the lower bound

values and integrated of order one, I(1) by the upper bound values. The null hypothesis of no cointegration is rejected if the F-statistics is above the upper bound and accepted if it falls below the lower bound. It, however, remains inconclusive if it lies between the lower and the upper bound critical values.

The second stage is to test for the long run relationship after establishing the presence of cointegration. The restricted version of the ARDL long run model for inflation is presented below.

$$\begin{aligned} \ln INF_t = & \varphi_0 + \sum_{i=1}^p \gamma_1 \ln INF_{t-1} + \sum_{i=0}^{q1} \gamma_2 \ln PWB_{t-1} + \sum_{i=0}^{q2} \gamma_3 \ln EXRDEP_{t-1} + \sum_{i=0}^{q3} \gamma_4 \ln M^S_{t-1} \\ & + \sum_{i=0}^{q4} \gamma_5 \ln GFD_{t-1} + \sum_{i=0}^{q5} \gamma_6 \ln PWBE_{t-1} + \mu_t \dots \dots \dots (3) \end{aligned}$$

The selection of the orders of the ARDL (p, q1, q2, q3, q4, q5, and q6) is based on the Schwarz Bayesian Criterion (SBC).

The third step in the ARDL model to detect the short run dynamics of the parameters is the estimation of an Error-Correction Model (ECM) reconciled with the long run evaluates. This is presented below.

$$\begin{aligned} \Delta \ln INF_t = & \sum_{i=1}^p \varphi_{1i} \Delta \ln INF_{t-i} + \sum_{j=1}^q \varphi_{2j} \Delta \ln PWB_{t-j} + \sum_{k=1}^q \varphi_{3k} \Delta \ln EXRDEP_{t-k} + \sum_{l=1}^q \varphi_4 \Delta \ln M^S_{t-l} \\ & + \sum_{m=1}^q \varphi_{5m} \Delta \ln GFD_{t-m} + \sum_{n=1}^q \varphi_{6n} \Delta \ln PWBE_{t-n} + \rho ECM_{t-1} + u_t \dots \dots \dots (4) \end{aligned}$$

The convergence of the short run dynamics coefficients of the model to equilibrium are denoted by φ_i in equation

(4). The Error-Correction Model is ECM_{t-1} and ρ is its coefficient which measures the adjustment speed of short run convergence to long run equilibrium in the event of a shock in the system.

4. EMPIRICAL RESULTS AND ANALYSIS

4.1. Test for Stationarity

The stationarity status of all variables specified for the study was determined prior to the long run relationship between inflation and its dynamic regressors. The outcomes of the unit root test through the Augmented Dickey-Fuller (ADF) are illustrated in Table 1.

Table-1. Unit Root Test Results

Variables	Log Level	First Difference
<i>lnINF</i>	-2.828548*	-6.131881***
<i>lnEXRDEP</i>	-2.767253*	-6.105646***
<i>lnPWB</i>	-0.393869	-4.699567***
<i>lnMS</i>	-4.608012***	-5.149442***
<i>lnPWBE</i>	-1.727693	-7.433020***
<i>lnINT</i>	-1.318369	-4.757814***
<i>lnGFD</i>	-1.618159	-7.138367***

Note: The rejection of the null hypothesis of a unit root/non-stationarity is indicated by ***, **, * at 1%, 5%, and 10% significance level respectively

From Table 1, inflation, exchange rate depreciation, and money supply were found to be stationary at their log levels which implies they are integrated of order zero $I(0)$. However, public sector wage bill- GDP, public sector wage bill-expenditure, interest rate and government fiscal deficit were all stationary after their first difference, hence integrated of order one, $I(1)$. It is, therefore, prudent to estimate the model using the ARDL bounds test specification.

4.2. Test for Long-Run Relationship

After establishing the stationarity status of all the variables, the study tested for the presence of a long run correlation among the variables by means of ARDL bounds test. The results are presented in Table 2.

Table-2. ARDL Bounds Test for Cointegration Results

F-Statistic	Significance Level	Lower Bound	Upper Bound	Cointegration Status
160.9149	10%	2.26	3.35	Cointegrated
	5%	2.62	3.79	
	1%	3.41	4.68	

The bounds test results confirm the existence of a long run relationship between the rate of inflation and the explanatory variables since the F-Statistics exceeds the upper critical values at 5% significance level (95% confidence level).

4.3. Long Run Results

The results in Table 3 show the long run link between inflation (the dependent variable) and its respective exogenous variables.

Table-3. Estimated ARDL Long Run Results

Dependent Variable: <i>lnINF</i>				
Regressors	Coefficient	Std. Error	T-Statistic	Prob.
<i>lnPWB</i>	0.734965	0.223980	3.281383	0.0305
<i>lnEXRDEP</i>	0.253187	0.072000	3.516475	0.0245
<i>lnMS</i>	0.940369	0.100096	9.394642	0.0007
<i>lnGFD</i>	-0.198768	0.078160	-2.543105	0.0638
<i>lnPWBE</i>	0.859088	0.317552	2.705343	0.0538
<i>Constant</i>	-5.270863	1.254405	-4.201883	0.0137

Source: Eviews 9.5 software generated results

It was found from the results in Table 3 that the coefficients of public sector wage bill as a percentage of GDP and public wage bill as a percentage of total government expenditure were positive and statistically significant at 5%. This implies that public sector wage bill is positively correlated with the rate of inflation in the long run. Specifically, a percentage rise in Ghana's wage bill as a percentage of GDP and total government expenditure leads to about 0.734965% and 0.859088% rise in the rate of inflation respectively. Thus, an increase in government wage bill increases the rate of inflation in Ghana in the long run. This finding is in line with the theory proposed by [Bhaduri \(1986\)](#) that the general price level is determined by a historically given level of the money wage. Keynes also proposes that inflation is the result of cost pressure emanating from wages. The result supports the empirical works of [Agénor and Hoffmaister \(1997\)](#) in four middle-income countries, [Milhajek and Saxena \(2009\)](#) in emerging market economies and [Perry and Cline \(2013\)](#) in the United States of America that wages and inflation are positively correlated.

Again, in line with economic theory, the coefficient of the depreciation rate of the Ghana cedi was found to be positive at 5% significance level of error depicting a direct long run correlation between inflation and exchange rate.

Precisely, 1% increase in the depreciation rate of the cedi increases Ghana's inflation rate by approximately 0.253187%. Hence, depreciation of the cedi increases inflation rate in Ghana. Depreciation of the cedi makes imports more expensive in the local market. Considering Ghanaians inelastic demand for imports, this increases the inflation rate in the country. The outcome of this study supports the positions of [Bawumia and Abradu-Otoo \(2003\)](#); [WAMZ \(2012\)](#) and [Sanusi \(2010\)](#) who finds exchange rate depreciation to be the vital source of inflation in Ghana.

Expansion in money supply exacerbating the inflationary tendencies in Ghana is justified in the results as it has the highest positive coefficient at 5% statistically significant level. It was found that money supply has the strongest long run direct impact on inflation in Ghana. A percentage rise in money supply increases inflation by 0.940369%. This reflects the monetarists' position that changes in the price level are proportional to the changes in the quantity of money. This also confirms the position that excessive growth in money supply is the sole most predominant source of inflation in Ghana. This certifies the findings of [Bawumia and Abradu-Otoo \(2003\)](#) which maintains that monetary expansion plays a significant role in determining inflation in Ghana.

Arguably, government fiscal deficit assumed a negative coefficient at 10% significant level. This implies there is an inverse relationship between fiscal deficit and inflation in Ghana in the long run. Statistically, 1% jump in fiscal deficit reduces the rate of inflation by 0.198768%. Thus, inflation in Ghana is less influenced by fiscal deficit. This could have been as a result of what Keynesian Economics explains that government deficit may be vital in long run price stabilization if it is geared towards the productive sectors of the economy and the removal of supply-side constraints to fuel growth and employment. This result contravenes those of [Ekanayake \(2012\)](#) and [Metin \(1998\)](#) in the Turkish and the Sri Lankan economy respectively that fiscal deficit and inflation are positively related.

4.4. Short Run Error Correction Results

The short run error correction model was estimated to identify the short run dynamics of the variables. It thus shows the short run correlation between the endogenous variable (inflation) and the various exogenous variables. The results are presented in Table 4.

It was observed from Table 4 that public sector wage bill as a percentage of GDP was positively related to the inflation rate in the short run just as in the long run. But it was statistically insignificant in the short run. This means that in Ghana, public sector wage as a percentage of GDP does not impact on inflation in the short run. This may mean that the increased wages turn to have a long run impact on the private sector to ignite the wage-price spiral as postulated by Keynes. Besides, because the public sector employs minority of Ghanaians relative to the private sector, high public wage cannot have more impact until in the long run when the private sector responds accordingly. Keynes also maintains because government spending such as wages is a component of aggregate expenditures and tax changes have dependable effects on consumption and investment. This suggests that workers in Ghana could save more for investment than current consumption in the short run.

On the contrary, public sector wage as a percentage of total government expenditure was found to be indirectly related to inflation in the short run. It has a negative coefficient at a statistical significance level of 5%. One percent rise in wage as a percentage of total government expenditure reduces inflation by about 1.12% in the short run. Thus, increase in public sector wage as a percentage of total government expenditure does not add up to the inflationary pressure in the short run. It can be deduced from this result that, this component of total government expenditure is matched with output in the short run and also directed towards the productive sectors of the economy and that it contributes less to inflation.

Table-4. Estimated ARDL Short Run Error Correction Results

Dependent Variable: <i>lnINF</i>				
Regressors	Coefficient	Std. Error	T-Statistic	Prob.
$\Delta \ln INF - 1$	-0.466975	0.050087	-9.323323	0.0007
$\Delta \ln PWB$	0.375597	0.209833	1.789982	0.1480
$\Delta \ln PWB - 1$	-3.124042	0.579797	-5.388165	0.0057
$\Delta \ln PWB - 2$	4.014513	0.456702	8.790233	0.0009
$\Delta \ln EXRDEP$	0.167312	0.017981	9.305067	0.0007
$\Delta \ln EXRDEP - 1$	0.284042	0.018603	15.268829	0.0001
$\Delta \ln EXRDEP - 2$	0.018159	0.023660	0.767514	0.4856
$\Delta \ln MS$	0.098897	0.036435	2.714374	0.0533
$\Delta \ln MS - 1$	-0.276507	0.060035	-4.605774	0.0100
$\Delta \ln GFD$	0.316166	0.051752	6.109259	0.0036
$\Delta \ln GFD - 1$	0.680141	0.090659	7.502175	0.0017
$\Delta \ln GFD - 2$	-1.160726	0.112410	-10.325846	0.0005
$\Delta \ln PWBE$	-1.123889	0.259929	-4.323827	0.0124
$\Delta \ln PWBE - 1$	-0.117250	0.265103	-0.442283	0.6811
$\Delta \ln PWBE - 2$	-4.716510	0.244046	-19.326308	0.0000
$ECM(-1)$	-0.690941	0.048637	-14.206059	0.0001
$R^2 = 0.9994$ $\bar{R}^2 = 0.9965$ $F(340.3710) = 0.000019$ $DW = 1.8644$				

Source: E views 9.5 software generated results

The cedi depreciation rate in the short run also has a positive coefficient at 1% significance level implying a short run positive relationship with inflation just as in the long run. Inflation in Ghana is increased by approximately 0.17% as a result of 1% increase in the depreciation rate of the cedi. Thus, exchange rate depreciation correlates positively with inflation in Ghana both in the long run and in the short run but the long run impact is more.

Just like in the long run, money supply was positively correlated with inflation in the short run. It has a positive coefficient of 0.098897 at 5% significance level of error. This result indicates that general price level goes up by approximately 0.1% in the short run due to a percentage growth in money supply. It can also be inferred that expansion in money supply impacts less on inflation in the short run than in the long run.

Government fiscal deficit showed a positive relationship with inflation in the short run contrary to the long run result. Fiscal deficit has a positive coefficient of 0.316166 which is statistically significant at 5%. Inferentially, fiscal deficit in Ghana significantly drives inflation in the short run. 1% growth in fiscal deficit drives inflation up to about 0.32% in the short run. This result suggests that though the impact of fiscal deficit on inflation can be detrimental in the short run due to inelastic productivity or aggregate supply, it can be instrumental in long run price stabilization and reducing inflationary tendencies. Ekanayake (2012) and Metin (1998) found similar results in the Turkish and the Sri Lankan economy respectively.

It can be observed from Table 4 that the short run model exhibits convergence to equilibrium in the long run out of a temporal shock. The coefficient of the error term is negative and statistically significant at 1%. The ECM coefficient of -0.690941 implies that about 69% of disequilibrium out of the shock in the preceding year converges back to equilibrium in the long run. This value is very high which means that any disequilibrium within the short run inflation dynamics of Ghana is quickly adjusted and converged back to equilibrium in the long run.

5. CONCLUSION AND POLICY IMPLICATIONS

Achieving price stability has been in the orbit of concern of state authorities for time immemorial. This paper is therefore focused on determining empirically the impact of public sector wage bill on inflation in Ghana for the period of 1986-2014. Using an Autoregressive Distributed Lag (ARDL) to cointegration model, it was discovered from the study that public sector wage bill, currency depreciation rate, money supply, and fiscal deficit all have significant impact on inflation in Ghana. The outcome of this study postulates that the rate of inflation determination in Ghana is also a fiscal phenomenon in spite of the significant and domineering role played by monetary expansion. Consequently, equal attention must be accorded both fiscal and monetary policy in the fight against the rate of inflation in Ghana for appreciable and sustained result.

There is also the need for an independent non-political fiscal body. Thus, apart from the monetary policy committee under Bank of Ghana, a fiscal policy committee should also be established under the same body independent of the Ministry of Finance to undertake the following as parts of its responsibilities; to ensure wage sustainability through negotiation of public sector wage adjustment subject to budgetary constraints aimed at reducing the wage bill-to-tax revenue, public sector reforms with specific emphasis on right-sizing the public service and policy freeze on employment into some unproductive sectors of the economy, rationalize the wage bill, pensions, gratuities and social security payments as part of measures to reduce the wage bill- to- tax revenue to Economic Community of West African States (ECOWAS) thresholds.

Lastly, since monetization of the deficit increases money supply the deficit should be financed through selling bonds to the public rather than the central bank as this creates non-monetary expansion.

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