

PRICE EXPECTATION AND THE PHILIPS CURVE HYPOTHESIS: THE NIGERIAN CASE

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ABSTRACT: *The objective of this study was to determine if there exist asymmetry between price expectation and unemployment as captured by Philip's curve in the Nigerian economy. In other word to determine the validity of Philips curve hypothesis in Nigeria. The Co-integration method was used to analyze this relationship between unemployment and inflation. The data were sourced from the Central Bank of Nigeria (CBN) statistical bulletin for the period under study (1970 to 2011).The result obtained revealed a direct or positive relationship between inflation and unemployment in Nigeria as against inverse relationship between the two macroeconomic problems. The implication of our finding is that policy planner's awareness of the Nigerian case would be guided on the path of policy direction in line with these twin evil of macro economy.*

KEYWORDS: Price Expectation, Unemployment, Macro Economy, Asymmetry And National Discomfort.

INTRODUCTION

Unemployment and inflation are twin evil of any economy. In spite of any economic system a country may adopts, two major goals of interest are low inflation and low unemployment rate, but quite often, these goals conflict, both in developed and developing countries.

In Nigeria, the level of unemployment as at 2011 stood at 24% while inflation rate stood at 11.7% as at August 2012. it follows therefore that about 11.65 million Nigerian are unemployed. In fact, the performance of an economy can be seen by looking at the inflation and unemployment rates. Both rates when added give a nation's "Misery Index" a measure of National discomfort. This trade off between inflation and unemployment is described and analyzed in the Philips curve. This empirical discovery by Philips in 1958 shows an inverse relationship between wages and unemployment rate.

Since the publication of Philips article there have been very extensive researches on the Philips curve at the theoretical as well as empirical levels.

With the growing clamor of Nigerian youth on high rate of unemployment, it becomes expedient on economic planners to proffers solution to the high rate of unemployment and inflation in the country.

The Philips curve equation gave way to the expectation augmented version in the early 1970s. Three innovations usher in this change. The first was the re-specification of the excess demand variables, originally defined as an inverse functions of the unemployment rate, $x(u)$, excess demand was redefined as the discrepancy or gap between the natural and actual rates of unemployment $U_N - U$. The natural (or full employment) rate of unemployment itself was defined as the rate that prevails in steady state equilibrium when expectation are

fully realized and incorporates into all wages and prices and inflations is neither accelerating nor decelerating.

The second innovation was the introduction of price anticipations into Philips curve analysis resulting in the expectations augmented equation $P = a(U_N - U) + P^e$

Where excess demand is now written as the gap between the natural and actual unemployment rates and P^e is the price expectation variable representing the anticipated rate of inflation. These expectation variables entered the equation with a coefficient of unity reflecting the assumption that price expectations are completely incorporated in actual price changes. The unit expectations coefficient implies the absence of money illusion i.e., it implies that people are concerned with the expected real purchasing power of the prices they pay and receive. The unit expectation coefficient also implies the complete absence of a trade off between inflation and unemployment in long run equilibrium when expectations are fully realized.

Despite several anti inflationary policies and employment generation programmes been put in place by the Nigerian government to curtail inflationary pressure and increasing unemployment, these two macroeconomic problems still persists. It is on this premise that we intend to investigate this problem to know why there still persist. And again given that there have been a mix up of outcomes of various investigations of this twin evil of macroeconomic problem in Nigeria and in other developed and developing countries, we were prompted by these conflicting results of non existence and the existence of inverse relationships between inflation and unemployment to empirically investigate employing the long run study approach of the cointegration analysis for further evidence. Therefore the purpose of this paper is to empirically investigate the pattern of relationship between inflation and unemployment in the Nigerian economy within the confine of the Philips curve. Put differently, to investigate the validity of the Philips curve hypothesis in the Nigerian economy. The paper would accept, modify or reject the Philip curves hypothesis as would be revealed by the outcome of the investigation.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The idea of an inflation-unemployment trade-off is hardly new. It was a key component of the monetary doctrines of Hume in 1752 and Thornton 1802. It was identified statistically by Fisher in 1926 as he viewed causation running from inflation to unemployment rather than vice versa. It was stated in the form of an economic equation by Jan Tinbergen in 1936 and again by Lawrence Klein and Arthur Goldberger in 1955. Finally, it was grasped on a scatter plot chart by A. J. Brown in 1955 and present in the form of a diagrammatic curve by Paul Sultan in 1957. Despite these early efforts, however, it was not until 1958 that modern Philips curve analysis can be said to have begun. That year saw the publication of Professor A. W. Philips' famous article in which he fitted a statistical equation $w=f(u)$ to annual data on percentage rates of change of money wages (w) and the unemployment rate (u) in the United Kingdom for the period 1861-1913. The result, showed a smooth, downward sloping convex curve that cut the horizontal axis at a positive level of unemployment.

The curve itself was given a straight forward interpretation. It showed the response of wages to the excess demand for labour as proxied by the inverse of the unemployment rate. Low

unemployment spelled high excess demand and thus upward pressure on wages. The greater this excess labour demands the faster the rise in wages. Similarly, high unemployment spelled negative excess demand that put deflationary pressure on wages.

The role of expectation in the natural rate hypothesis is remarkable. In this hypothesis, the difference between one short run Philips curve and another is due to the difference in expectation about inflation which itself is based on the perception of economic agents of the course of policy formulation and implementation. Consequently, whatever exists by way of trade off between inflation and unemployment under the natural rate hypothesis is attributable to unexpected inflation. Thus the trade offs are short run phenomena which are due to unexpected inflation but which disappear as soon as expectations with its embodying wages and prices fully adjust to inflationary experiences.

According to Thomas Humphrey one of the factor contributing to the success of the Philips curve was its ability to accommodate a wide variety of inflation theories.

The Philips curve itself explained inflation as resulting from excess demand that bids up wages and prices. It was entirely neutral, however, about the causes of that phenomenon. Excess demand can of course be generated either by shifts in demand or shift in supply regardless of the causes of those shifts.

The demand pull theorist could argue that excess demand induced inflation stems from excessively expansionary aggregated demand policies while a cost – push theorist could claim that it emanates from trade union, monopoly power and real shocks operating on labour supply. The Philips curve could accommodate both views. Economist or rival schools could accept the Philips curve as offering insights into the nature of the inflationary process even while disagreeing on the causes of appropriate remedies for inflation.

The original Philips curve was expressed in terms of changes in nominal wages $w=f(u)$. Since the Neo classical economic theory teaches that real rather than nominal wages adjust to clear labour markets, however, it follows that the Philips curve should have been stated in terms of changes in real wages changes.

Better still, it could have been stated in terms of expected changes in real wage e.g the differential between the rates of change of nominal wages and expected future prices, $w-p^e = f(u)$.

The structural theories, explain the long – run inflationary trend in developing nations in terms of certain structural rigidities, market imperfections and social tensions in those nations – relatives in elastic of food supply, foreign exchange constraint, protective measures, rise in the demand for food, fall in export earnings, hoarding, import substitution industrialization, political instability etc. the monetarists opine that inflation is always and everywhere a monetary phenomenon hence prices rise when the rate of increase in money supply is greater than the rate of increase in real output of goods and services.

In economics literature, the concepts of inflation have been intrinsically linked to money, as captured by the often heard maxim “inflation is too much money chasing too few goods”. Inflation has been widely described as an economic situation where the increase in money supply is “faster” than the new production of goods and services in the same economy, Oluleye (2005). The fiscal factors relate to financing of budget deficits, largely through money creation process. Under this view, inflation is said to be caused by large fiscal

imbalances, arising from inefficient revenue allocation procedures and limited development of the financial markets, which tends to increase the reliance on seignior age as a source of deficit financing.

A major criticism of the Philips curve is that it does not take into account the interaction in the underlying structural behavior of consumers and firms in the economy, but rather capture empirical regularities between unemployment and inflation rates based purely on correction in historical data. The Lucas critique, for instance, opined that they may not be entirely exploited by the monetary authority or inflation expectations shift in a particular direction, which does not align with historical data. Perhaps, the greatest weakness of the Philips curve is its lack of theoretical underpinnings. No known study has derived a Philip curve from first principles, beginning with the fundamental concerns and constraints of consumers and firms. This is not to say that the empirical relationship makes no sense. For instance, labour markets strongly influence changes in wages and prices. As Bello (1999) stated, “still some felt that this lack of vigorous theoretical foundation is a fatal flaws, and found this deficiency less life threatening”.

As established by Iyoha et al (2003) unemployment is a stock concept and hence can be measured only at a point in time. For example, we can measure the rate of unemployment in Nigeria as at December, 2012. To get the unemployment rate, we must first determine the size of the country’s labour force. This can be derived from the country’s working population, the working populations consist of persons in the country who are in the working age bracket (usually 16-65years) and are well and fit to work. The labour force defines the number of working age persons who are none institutionalized and are working or willing to work.

To calculate the unemployment rate, we must first decide on how long a person need to be out of job before he/she can be considered unemployed. Once this is determined, persons willing and able to work at the existing wage rate and have been out of job for periods above the acceptable duration are considered unemployed. This takes into consideration the four basic types of unemployment namely: frictional structural, cyclical or Keynesian and classical.

According to Keynesian theory changes in aggregate demand, whether anticipated or unanticipated, have their greatest short run effect on real output and employment not on prices. This idea is portrayed for example in Philips curves that shows inflation rising only slowly when unemployment falls. Keynesians believe that what is true about the short run cannot necessarily be inferred from what must happen in the long run, and we live in the short run. They often quote Keynes famous statement. “In the long run, we are all dead” to make the point.

The new classical argued that the Keynesian economics of the 1960s often appealed to the Philips curve, taking it to imply that monetary or fiscal policy that lowered the unemployment rate also caused a higher inflation rate, the interesting policy question was the trade – off. The new classical asked how much extra inflation was a one – point fall in the unemployment rate worth? They rejected the idea that there was any useful trade off. They argued that an expansion of aggregate demand lowered unemployment only because the acceleration in prices was not anticipated. Firms that mistook higher market prices for higher real return would be willing to produce more. Workers who mistook higher market wages for higher purchasing power would be willing, if unemployed, to take a job sooner. Increased

output lowers unemployment and would however, be temporary because neither workers was corrected for inflation, really higher. As soon as they realized the mistake, firms and workers would return to old level of production and labour supply. Philips (1958) raised the consciousness of the policy makers on the implication of attempting to simultaneously reduce inflation as well as unemployment. In response to Philip's stance, Gbosi (2004) opined that "there appeared to be no inverse relationship between the rate of unemployment and inflation rate in Nigeria".

He made this assertion based on the plotting of the graph on unemployment rate against the rate of inflation for the period 1980-2000. However numerous studies like that of Asogu (1998), Anyanwu (1993), Orji, Anthony-Orji and Okafor (2015), etc, attest to the fact that there is no inverse relationship between inflation and unemployment in Nigeria. On the other hand Oluleye (2005) in his study using the descriptive approach of plotting two-dimensional graph of inflation and unemployment data for the period 1980-2003, found that there exist an inverse relationship between inflation and unemployment in Nigeria, likewise Onwioduokit (2006) who also found a negative relationship in his study. These conflicting results are pointers to further investigation, hence this present study.

METHODOLOGY

Data and Model Specification

The data used for this study are inflation and unemployment and are sourced from the CBN statistical Bulletins.

In view of the strength of our literature review, the model for the study is specified, as follows:

$$\pi_t - \pi_t^e = \beta_2 (UN_t - U^N) + U_t \quad (1)$$

Where:

π_t = Actual inflation rate at time t

π_t^e = expected inflation rate at time t, the expected being formed in year (t – 1)

UN_t = actual unemployment rate prevailing at time t.

U^N = Natural rate of unemployment

U_t = the stochastic error term

Since π_t^e is not directly observable, as a starting point one can make the simplifying assumption that:

$\pi_t^e = \pi_{t-1}$: That is, the inflation rate expected this year is the inflation rate that prevailed in the last year.

Substituting the above into the model, we obtain the following estimating model.

$$\pi_t - \pi_{t-1} = \beta_1 + \beta_2 UN_t + U_t$$

$$\pi D = \beta_1 + \beta_2 UN_t + U_t \quad - \quad - \quad - \quad - \quad - \quad (3)$$

Where $\beta_1 = -\beta_2 U^N$

Estimation Method

The estimation method employed for this study is the Johansen (1988) co-integration estimation technique. This is because according to Iyeli (2010) it provides a connection between integrated processes and the idea of long run equilibrium. Therefore, our starting point would be to conduct stationarity test of the variables in our model using the Augmented Dickey – Fuller (ADF) unit root which is derived from Dickey and Fuller (1979, 1981). This is then followed by the cointegration test and finally the Error Correction Mechanism (ECM)

EMPIRICAL RESULTS AND DISCUSSION OF FINDINGS

ADF Unit Root Result (Stationarity Test)

Variables	ADF Values	Decision
πD	-6.490402	1(1)
UN_t	-6.702668	1(1)
Critical values		
1% = -3.605593		
5% = -2.936942		
10% = 2.606857		

Source: Authors computation

The unit root result presented above, shows that πD (change in inflation rate) and UN_t (actual unemployment) are stationary at first difference. The stationarity of these two variables are base on the Augmented Dickey Fuller (ADF) method of testing for unit root. Therefore, a co-integration test was carried out to confirm and determine the existence of a long run relationship among the variables (i.e inflation and unemployment).

Co-Integration Result

Unrestricted Cointegration Rank Test (Trace)

Prob***	0.05 Critical value	Trace statistic	Eigenvalue	Hypothesized No. of CE(s)
0.0000	15.49471	33.47211	0.538002	None*
0.1079	3.841466	2.584313	0.062565	At most 1
Trace test indicates 1 co-integrating eqn (s) at the 0.05 level				
*denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Prob***	0.05 Critical value	Max-Eigen Statistic	Eigenvalue	Hypothesized No. of CE(s)
0.0001	14.26460	30.88780	0.538002	None*
0.1079	3.841466	2.584313	0.062565	At most 1
Max-eigenvalue test indicates 1 co integrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author's Computation

The Johansen co-integration test reveals that there is a long run relationship between changes in inflation rate (πD) and actual unemployment (UN_t). The result indicates one co-integrating equation at 5 percent level of significance in both the trace statistic and the maximum Eigen statistic. The conclusion drawn from the result is that there exists a unique long – run relationship between (πD) and (UN_t). Since there is a one cointegrating vector, an economic interpretation of the long run relationship on πD in Nigeria can be obtained by normalizing the estimates of the unconstrained vector on changes in inflation rate.

The identified co-integrating equations can then be used as an error correction term (ECM) in the error correction model.

Error Correction Mechanism

Over parameterized Result

Prob	t-statistic	Std-Error	Coefficient	Variable
0.9355	0.081574	2.902219	0.236746	C
0.9148	-0.107847	15.28448	-1.648388	D(UNT(-1))
0.0852	-1.880091	1.275019	-1.122133	D(UNT(-3))
0.0521	2.187931	0.171776	-0.031182	TTD(-1)
0.0428	0.199938	15.36329	-1.071706	ECM(-1)
0.175263	Mean dependent var		0.665018	R-squared
17.21714	S.D dependent var		0.548313	Adjusted R-squared
8.698949	Akaike info criterion		17.62814	S.E of regression
8.914421	Schwarz criterion		10254.79	Sum squared resid
8.775613	Hannan-Quinn criter		-160.2800	Log likelihood
2.072596	Durbin-Watson stat		2.573698	F-Statistic
			0.68361	Prob(F-statistic)

Source: Author's Computation

Parsimonious Result

Prob	t-statistic	Std-Error	Coefficient	Variable
0.0727	2.034488	2.779508	0.095858	C
0.0036	-1.950639	0.168646	-0.242269	$\pi D(-1)$
0.0695	2.165491	1.237950	1.204869	D(UNT(-3))
0.0050	2.208417	1.220266	-0.474590	ECM(-1)
0.047692	Mean dependent var		0.741376	R-Squared
17.00776	S.D dependent var		0.640791	Adjusted R-Squared
8.642112	Akaike info criterion		17.35117	S.E of regression
8.812734	Schwarz criterion		10537.21	Sum Squared resid
8.703329	Hannan-Quinn criter		-164.5212	Log likelihood
2.006973	Durbin-Watson stat		2.503561	F-statistic
			0.68231	Prob(F-Statistic)

Source: Author's Computation

The over parameterized model is difficult to interpret in any meaningful way, its main function is to allow us identify the main dynamic patterns in the model. However, the parsimonious model as seen above reveals that $\pi D(-1)$ and $UN_t(-3)$ violates a priori expectations. This means that a 5% increase in lag one year of changes in inflation rate (πD)

will lead to 1.21% reduction in the dependent variables. While a 5% increase in unemployment (UN_t) will instigate an increase of about 6.02% in the dependent variable. From our result, πD and UN_t are statistically significant at 5% level of significance. This is due to the fact that their t-values calculated (-1.9506 and 2.16555) in absolute terms are greater than their tabulated t-values 2.021 at 5% and 1.684 at 10%. The F-statistic shows that our model is not statistically significant meaning that our model cannot be relied upon to forecast the future behaviour of inflation in Nigeria. Our Durbin Watson statistic of 2.0069 according to our estimated results falls on the No auto correlation region, hence, we can affirmed that there is no auto correlation in our result. The statistical significant of our ECM reveals that the speed of adjustment is slow. The speed of adjustment is 47.5%, meaning that the long run deviation will be corrected by 48% within the short run period. The adjusted R square shows that 74.14% of the total variation in the dependent variable is explained by the explanatory variable in the model leaving the remaining 25.86% for variables not captured in the model.

SUMMARY OF FINDINGS AND POLICY IMPLICATIONS

Summary of Findings

The objective of this study was to investigate the asymmetry between price changes and unemployment as postulated in Philips curve analysis. Arising from the results, we found that (i) the lag value of inflation reduces inflation in Nigeria during the period of this study (ii) also, instead of unemployment reducing inflation as postulated in Philips Curve, unemployment rather contributed significantly to fuel inflation in Nigeria (iii) the study reveals that the speed of adjustment of 47.5% is slow and that the explanatory variable used explain only 74.14% of the total variation in Inflation (iv) finally, the study rejects Philips curves hypothesis of inverse relationship, between inflation and unemployment in Nigeria. This suggests that as unemployment increases inflation also increases in the same direction, and this is the situation in Nigeria currently.

Contribution to knowledge

Most of the previous studies reviewed in Nigeria are either tailored towards the impact of inflation rates on economic growth or the impact of unemployment rates on economic growth in Nigeria, with few of these studies investigating the relationship between inflation and unemployment. It was obvious that none of these studies explore the direct relationship between the two variables. Therefore, this study differs from these other studies by the restrictive nature of the model specified here. Other studies incorporate intervening variables into their models which may likely distort the true picture of the relationship. This study seeks to establish the true or clear picture of the relationship devoid of distortions by these check variables, hence, the modeling of this study was restricted to the two variables concerned, that is inflation and unemployment. Again another point of departure from these other works were the use of expected inflation rate, and natural unemployment rate a long side with the actual inflation and unemployment rates respectively. Finally, in the course of this study, investigation has shown that no study has used the cointegration method in the analysis of the direct long run relationship between inflation and unemployment in Nigeria. Therefore this study is a deviation from other studies in terms of methodology in the usage of cointegration analysis as against the approaches used by the previous studies in Nigeria, and

also the use of expected rate of inflation and natural unemployment rate as variables. In this direction, the study has further unveiled other behavioral dimension in the form of positive relationship as oppose to the known inverse or negative relationship between inflation and unemployment in Nigeria.

Policy Recommendations

From our findings;

- (i) Unemployment positively stimulate increase in inflation, therefore government must put in place adequate measures towards reducing unemployment in Nigeria. Such measures include incorporation of entrepreneurship in the curriculum of all levels of education in Nigeria to discourage or reduce dependence on white collar jobs and encourage self employment.
- (ii) Government should also provide an enabling environment to encourage small and medium scale enterprises in Nigeria.

In conclusion, an understanding of the relationship between unemployment and inflation is vital for appropriate policy formulation; therefore a study of this nature is imperative since it has empirically revealed the existence of positive relationship between these two variables within the period under study in Nigeria

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