

ANALYSIS OF THE IMPACT OF INFLATION RATE ON BALANCE OF PAYMENTS IN NIGERIA

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Abstract

Inflation is a highly controversial term that has undergone modification since it was first defined by neo-classical economists. They meant it a galloping rise in prices as a result of the excessive increase in the quantity of money. They viewed inflation as a rescinding syndrome natural due to the absence of financial mechanism whose result undermined the rules of business, creating havoc in markets and financial ruin of even the prudent. Based on these facts, we had to analyse the impact of inflation rate on balance of payment and to know if there exists any relationship between inflation and balance of payment as well as price levels. This study used secondary data sourced from the Central Bank of Nigeria Statistical Bulletin (1986-2021) in its analysis. The study employed Engle and Granger Co-integration Test and Error Correction Model (ECM) to estimate the short run and long run impact of inflation on BOP in Nigeria. The model showed a long run relationship between BOP and inflation in the country. The empirical result further showed that inflation has a negative and significant impact on BOP position in Nigeria. The study recommends that the policy makers should take keen interest on how best to improve the value of Nigeria's export to the world; this will help bring to equilibrium the inflation that plays a crucial part in determining the balance of payments.

Keywords: *Inflation, Balance of Payment*

1. Introduction

Inflation is the degeneration of purchasing power of a given currency over time. A measureable estimate of the rate at which the decline in purchasing power occurs can be reflected in the increase of an average price level of a basket of selected goods and services in an economy over some period of time. The upswing in the universal level of prices, frequently stated as a percentage, means that a unit of currency effectively buys less than it did in prior periods. Inflation can be contrasted with deflation, which occurs when the procuring power of money grows and prices deteriorates, (Jason, Michael and Pete, 2022).

Over again, inflation is the rate of intensification in prices over a specified epoch of time. Inflation is typically a broad measure, such as the overall upturn in prices or the upsurge in the cost of living in a country. But it can also be more intently calculated-for certain goods or for services, such as a haircut, for example. Whatever the context, inflation represents how much more expensive the relevant set of goods and/or services has become over a certain period, most regularly a year, (IMF Global Economic Forum, 2020).

Consequently, the higher inflation leads to the appreciation of the domestic currency with a resultant increase in the imports of goods and thereby a loss of competitiveness in the non-oil tradable goods sector. This phenomenon popularly known as 'Dutch disease' has been vigorously discussed in UK, Norway and Netherlands because of the North Sea oil. It has also been received from Australian Economists. In order to quantify the inflationary impact of the oil

price increase on the Nigerian economy, we utilised the money demand function based on the adaptive expectation hypothesis. The empirical result indicates within the period of study, changes in the domestic price of imports played a dominant role in the determination of inflation in Nigeria rather than the excessive domestic monetary expansion, (Okonkwo, 1987).

Inflation has led to deterioration in the balance of payment. As the price level rises, the country's export becomes clearer in the world market. This reduces the demand for such exports. If additionally, the country's price level is rising faster than that of the rest of the world, this will encourage imports and consequently lead to a balance of payments problem. The mechanism through which oil exports exerts their influence on the Nigerian economy is through the effect that changes in the price of oil will have on the real exchange rate. The overall effect of the oil increase is the real appreciation of the resulting loss of competitiveness in the other non-oil tradable goods sectors. This effect is via the real exchange rate and is transmitted through two channels. First, the surge in oil prices will end in advanced disposable revenue and in an upsurge in the demand for tradable and non-tradable imports, to the extent that the prices of other non-oil tradable are given by the world price. This income effect will result in a higher relative price of non-tradable and real appreciation of the naira. Secondly, an increase in oil prices will tend to generate a balance of payments surplus, and accumulation of international reserves. If this international reserve is not fully sterilised, the monetary base will also increase and inflation will tend to result, with the consequent further appreciation of the Naira, Finally, whenever the central bank manipulates interest rates, it exerts influence on both exchange rates and inflation rates. (Okonkwo, 1987)

Due to the close relationship that exists among macroeconomic stability and economic competitiveness of a country internationally, this study sought to establish the role played by the Inflation on balance of payments in Nigeria.

The main objective of this study is to analyze the impact of inflation rate on the balance of payment in Nigeria.

2. Review of Related Literature

2.1 Theoretical Review

Understanding the sources of fluctuations in output and inflation is an important challenge to empirical macroeconomists. It is an issue taken up in a large number of recent studies in the developed nations, Latin America, and Asian countries. At the core of this issue is whether or not stabilization without recession is possible. While some theoretical models suggest that stabilization could be expansionary particularly for high inflation countries, others argue that stabilization without recession is rather difficult to achieve (Maćkowiak, 2003).

Expectational Theory of inflation: where there is expected rise in the prices of goods and services, people tend to buy more even at the presently high price. Thus, they quicken the arrival of the expected inflation. That is, if people expect the price of goods and services to rise next month, they will respond by buying more goods and services this month. Such action has always

led to an increase in the general price level. It is however, important to note that anticipated inflation is not as harmful as unanticipated inflation. The argument here is that if wealth-holders know that the rate of inflation will rise next year, they will know how to adjust their wealth portfolios, (Ball, 1964). Institutional Theory of Inflation: the theory argues that prices move autonomously and independently from evolving market conditions. Price undertaking appears as a reaction to explicit sociological and socio-political forces or institutional arrangement, (Hagger, 1977). Such approach in measures of price level is responsible for prevailing impulse forces either with fiscal or monetary progression (Nwikina, 1996).

According to Gerlach and Smets, (2000), Inflation can be very damaging for a number of reasons. **First**, people may be left worse off if prices rise faster than their incomes. **Second**, inflation can reduce the value of an investment if the returns prove insufficient to compensate them for inflation. **Third**, since bouts of inflation often go hand in hand with an overheated economy, they can accentuate boom-bust cycles in the economy. Sustained inflation also has longer-term effects. If money is losing its value, businesses and investors are less likely to make long-term contracts. This discourages long-term investment in the nation's productive capacity. The relationship between inflation targeting regime and exchange rate regime has led some analysts to conclude that one of the costs of inflation targeting adoption is the increase in exchange rate volatility. Yet, some studies show that the adoption of a free-floating exchange rate does not necessarily implies more effective of nominal and real exchange rate floating argue that inflation targeting would lead to higher exchange rate volatility find that the lack of credibility of monetary authority may lead to exchange rate volatility problem (Levy-Yeyati, & Sturzenegger, 2002).

The three major explanations of inflation include fiscal, monetary, and balance of payments aspects. While in the monetary facet, inflation is reflected to be owed to an upturn in money supply, in the fiscal facet, budget deficits stand the ultimate cause of inflation in countries with sustained high inflation. However, the fiscal facet is carefully connected to financial justifications of inflation since government deficits are often sponsored by money making in developing countries. In the balance of payments aspect, emphasis is placed on the exchange rate. Simply, the exchange rate collapses bring about inflation either through higher import prices and increase in inflationary expectations which are often accommodated or through an accelerated wage indexation mechanism (McCallum, and Nelson, 2000).

The modern theory of inflation is, in fact, a synthesis of classical and Keynesian theories of inflation. The modern approach to inflation follows the theory of price determination. The price theory tells us that, in a competitive market, the price of a commodity is determined by the market demand for and the market supply of the commodity and that the variation in the price of the commodity, if any, is caused by the variation in the demand and supply factors. Likewise, the aggregate price level is determined by the aggregate demand and aggregate supply and variation in the aggregate price level is caused by the variations in the aggregate demand and aggregate supply (Dwivedi 2007).

2.2 Empirical Review.

Diverse scholars and researchers have studied the determinants of balance of payments in diverse countries. Below are some of the international and local reviews carried out by researchers.

A study by Alex and Inne (2006), considered the relationship between expected inflation and nominal interest rates in South Africa and the extent to which the Fisher Effect hypothesis holds using 3months banker's acceptance rate and the 10year government bond rate to proxy both short and long term interest rates, found the existence of long term unit proportional relationship between nominal interest rates and expected inflation using Johansen co-integration test.

A study by Pattnaik and Mitra (2001) point out that interest rates, inflation rates and exchange rates are all highly correlated. By manipulating interest rates, central banks exert influence over both inflation and exchange rates, and changing interest rates impact inflation and currency values. The real exchange rate is the actual exchange rate adjusted for inflationary effects in the two countries of concern.

Imoisi (2014) scrutinized the trends in Nigeria's Balance of Payments position from 1970-2010 using a multiple regression analysis using the ordinary least square method for both linear and log linear form. The study found that the balance of Payments position has been undermined by a relatively poor non-oil export, high import bill, stagnated agriculture, high taste for foreign goods and services, continuous fall in the country's foreign exchange, inflationary pressure, inefficient manufacturing sector and mishandling of the oil boom. The study acclaimed that the government ought to increase the non-oil exports and vary the industrious base of the Nigerian economy so as to correct the deficits in the current account of the country's balance of payments.

Ezirim (2012) explored the interdependencies between exchange rates and inflation rates behaviour in Nigeria. Using autoregressive distributed lag analytical framework, they found that exchange rates movements and inflation spiral are co-integrated, correlating both in the short run and in the long run. Thus, signifying that in a regime of inflation steering policy aimed at exchange rates influence becomes a proper monetary action, and vice versa. The existing study includes interest rate as one of the explanatory variables given that it is one of the important monetary phenomena, which is a key driver of exchange rate in an economy. Without doubt, the above position of the MABP had spawned numerous empirical literatures. Most scholars agreed to the fact that Balance of payments is entirely a monetary phenomenon (Spanos & Taylor, 1984; Ajie & Nenbee, 2010; Dhliwayo, 2004; Udude, 2015). Others differed such as the works of Ali (2010), Radulescu (2007) and Nawaz et al (2014). This empirical gap justifies the focus of this study.

Oloye (2007) evaluated the impact of fiscal deficit on current account balance in the country between from 1970 to 2010. The study employed unit root test, co-integration and Granger Causality test. The variables used in the study are current account, fiscal deficit, real GDP, nominal Effective Exchange Rate (ERR) and prime rate which are the determinants of balance of payments. The Johansen-Julius co-integration techniques revealed a long run equilibrium relationship among the variables and the results indicated that no co-integrating relationship was found among the variables.

3. Methodology

3.1 Model Specifications

Given that this study aims at analysing the impact of inflation on balance of payments in Nigeria, the functional form of the model specification is specified as:

$$BOP = f(INF) \dots\dots\dots (3.1)$$

Where: BOP = Balance of payment, INF = Inflation Rate

To estimate the above equation, we transformed the functional form into an estimated model as:

$$BOP_t = \alpha_0 + \alpha_1 INF_t + \mu_t \dots\dots\dots (3.2)$$

The Engle and Granger Cointegration test which uses unrestricted error correction model (UECM) was employed here to estimate the effects of Inflation on balance of payment in Nigeria. The Engle and Granger cointegration model was developed by Pesaran (1997) and used by Pesaran, et al (2001); Masron (2009); Owusu (2012), among others. The major advantage of this approach is since it can be applied irrespective of whether the variables are I (0) or I (1). This approach also allows for the model to take enough lags to capture the data generating process in a general-to-specific modelling framework. Although, a dynamic error correction model (ECM) can be derived from Engle and Granger through a simple linear transformation, Banerjee et al., 1998 and Pesaran et al., 2001, have introduced bound testing as an alternative to test for the existence of co-integration among the variables. The bounds test procedure is merely based on an estimate of unrestricted error correction model (UECM) using ordinary least squares estimator. Tang (2003) argues that the UECM is a simple re-parameterization of a general Engle and Granger model. The model is stated as:

$$BOPt = \alpha_0 + \sum_{i=0}^q \gamma_i BOPt - i + \sum_{i=1}^q \gamma_i INFt - i + \mu_t \dots\dots\dots (3.3)$$

In order to obtain the co-integrating equation, equation 3.3 is transformed into 3.4 as follows:

$$BOPt = \alpha_0 + \sum_{i=0}^p \gamma_i BOPt - i + \sum_{i=1}^q \beta_i \Delta INFt - i + \phi_1 ECT_t + \mu_{it} \dots\dots\dots (3.4)$$

Where: The Bound test procedure used equations 3.4 and 3.5 into 3.6 as:

Then we test the existence of level relationship as $\rho = 0$ and $\delta_1 = \delta_2 = \dots = \delta_k = 0$

Where= difference operator, μ = white noise error term.

3.2 Unit Root and Co-Integration Test Results

Since the validity of the ENGLE AND GRANGER approach relies on $I(0), I(1)$ or a combination of both, it is important to first determine the time-series properties of individual variable that enter equation (3.3). This is done to know whether the variables are integrated of order zero or one or even more. Given that unit root testing procedures have their own limitations. Two unit root tests were considered for this research. These are the non-parametric Philip-Perron (PP) test proposed by Phillips and Perron (1988) and the popular Augmented Dickey-Fuller (ADF) unit root test. Both the ADF and the PP test the null hypothesis that the series have unit root (variables not stationary).

3.3 Data Source and Econometrics Software.

The data used in this study obtained from Central Bank of Nigeria (CBN) statistical bulletin 2021, the bureau of statistics 2021. The E-views 10.0 software was used in analysing the data while the Ms-Excel was used to transport the data.

4. Results and Discussion

This chapter presents analysis and findings of the study as set out in the research objective and research methodology. The study findings are presented the analysis of the impact of inflation on balance of payment in Nigeria. The data was collected from secondary source, which included the records at Central Bank of Nigeria and National Bureau of Statistics.

4.1 Static Regression

TABLE 1: Ordinary Least Square Summary

Variables	Coefficient	Std. Error	T-statistics	Prob.
C	136.4077	3541.124	0.038521	0.9695
Inf	447.9438	140.0583	3.198268	0.0027
R – squared	0.207783			
Adjusted-R-Squared	0.187469			
Durbin-watson	1.502121			
Prob(f-statistics)	0.002744			

Source: Computed by the Researcher with Eview 10

In the regression table above, the probability level is used to decide a significant level of the variable. Decision rule: a coefficient is said to be significant if the probability level is less than or equal to 0.05 (5%), but if probability value is greater than 0.05 (5%) then the variable is insignificant. So from our result above, the variables INF, is significant to BOP because the P-value is less than or equal to 0.05. Again, it is a change in independent variable that brings about a change in dependent variable. An increase in INF by N1 brings about an increase in BOP by 447.9438; invariably INF has a positive and significant relationship with BOP. This implied that INF has an impact on BOP. The regression table shows that the model fit is significant ($0.002744 < 0.05$), hence valid for prediction. The Coefficient table shows the intercept and the slope. The intercept of .0.9695 shows the value of the independent variable when the dependent is constant. R^2 is used to measure the goodness of fit. It explains the percentage of variation in the dependent variables accounted for by the changes in the independent variables. So from our result, R^2 is 0.207783 which implies that 21% of the variation in BOP is explained by the changes in INF. The R^2 of 0.21 or 21% shows a weak positive relationship between the dependent variable (BOP) and the independent variable INF. Adjusted R-squared of 0.187469 shows that 18% of the variation in the dependent variable is explained by the independent variable. The F-statistic measures the overall regression. The decision rule is that the model has an overall significant effect if the P-value is 0.05, but it is not significant if the P-value is greater than 0.05. And from our result, the P- value of the F-statistic is 0.05 thus there is an overall effect of the included independent variable.

Then Durbin-Watson statistic: a result is said to be spurious by rule of thumb if R^2 is greater than Durbin-Watson statistics. And from our result, $R^2 = 0.21$ while Durbin-Watson =1.50. By interpretation R^2 is less than Durbin-Watson, which means it is not a nonsensical result and can be used for forecasting or policy making. What this means is that it is a good result because there is no atom of spuriousity in it and the overall regression is significant.

4.2 Unit Root Test

In this study, the Augmented Dickey-Fuller (ADF) unit root test was employed to test for the time series properties of the model variables. This is necessary as it helps to avoid spurious regression results. The ADF tests the null hypotheses that the series has a unit root (not stationary) as against the alternative that the variable has no unit root. The choice of lag length was based on Akaike and Schwartz-Bayesian information criteria and was selected automatically by E-views. The decision rule is to reject the null hypothesis if the ADF statistic value exceeds the critical value at a chosen level of significance (in absolute term). These results are presented in table 2 below.

Table 2: Summary of ADF test results at 1% and 5% critical value

Variables	ADF Statistics		ADF Critical Value		Optimum Lag Length	Order of Integration	Remark
	Level	Ist Diff	1%	5%			
BOP	-2.9734		-3.6056	-2.9369	0	I (0)	Stationary
IINF	-3.0475		-3.6056	-2.9369	0	I (0)	Stationary

Source: Computed by the Researcher with Eview 10

From table 2 above, observe that the variables BOP and INF were integrated of order zero (I ~ (0)) as they were stationary at level form. The decision was based on the fact the ADF statistics was greater than the critical values at 5% significance level. Since the the variables are integrated of order 1(0), we therefore, applied the Engle and Granger co-integration test. But we will run Augmented Dickey Fuller unit root test on Error Correction Terms first.

4.3 ADF On ECT Engle And Granger Cointegration Test

Table 3 Augmented Dickey-Fuller unit root test

Adf unit root on ect statistics	Adf critical value	Optimum lag length	Order of integration	Ramark
Level	5%			
-3.605593	-2.606857	0	1(0)	Stationary

Source: Computed by the Researcher with Eview 10

The first step taken for Augmented Dickey-Fuller unit root test on Engle and Granger ECT estimation is testing data stationarity of each variable, both the dependent variable and the independent variables. In this study, to detect stationarity of each variable, the ADF test (Augmented test Dickey-Fuller) is applied by comparing ADF statistics with critical Mac Kinnon's values at a significant level of 1 percent, 5percent, and 10 percent, respectively. Based on Table above, it can be seen that ECT at Level, are stationary as indicated from p-value which

is greater than alpha ($\alpha = 0.05$). ie, Obviously from the regression analysis of the residual unit root test, the ADF statistics is critical at 5%, because ADF is greater than the t-statistics, meaning that ECT is stationary at level, therefore there is co-integration.

4.4 Error Correction Model (ECM)

Since there is co-integration, we can now run error correction model. The coefficient of the lag of the residue is the Error correction term that measures the speed of adjustment between dependent and independent variable. The result is below:

Table 4: Error correction term

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.008770	0.286690	-0.030589	0.9758
D(LNINF)	0.257619	0.221990	1.160499	0.2533
ECT(-1)	-0.361610	0.130093	-2.779622	0.0085
R-squared	0.180486			
Durbin-Watson stat	1.971956			
Prob(F-statistic)	0.025165			

Source: Computed by the Researcher with Eview 10

The coefficient of ECT is negative. So from the result it is wonderful because Durbin Watson statistic result is up to 1.97% meaning that it is not spurious. ECT is appropriately signed and significant. The appriori expectation is right. The R-squared is poorly fitted and the F-statistic is significant. Though Durbin Watson is the appropriate test for autocorrelation in a model with lag of dependent variable, the Durbin Watson statistics showed no autocorrelation in the model and there is also a long run relationship between Inflation and Balance of Payments.

4.5 Engle and Granger Cointegration Test

Engle and Granger cointegration Test are used to measure the long run regression test between variables amongst other test measures. This method is therefore used when variables are integrated of the same order say 1(0), or 1(1).

Table 5 Engle and Granger cointegration Test

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
BOP	-5.123751	0.0009	-55.59191	0.0000
INF	-3.888420	0.0205	-22.33179	0.0137

Source: Computed by the Researcher with Eview 10

The long run result in table 5 shows that inflation rate has negative but significant impact on BOP position in Nigeria. Accordion to Gerlach and Smets, (2000), Inflation can be very damaging for a number of reasons. **First**, people may be left worse off if prices rise faster than their incomes. **Second**, inflation can reduce the value of an investment if the returns prove insufficient to compensate them for inflation. **Third**, since bouts of inflation often go hand in hand with an overheated economy, they can accentuate boom-bust cycles in the economy.

Sustained inflation also has longer-term effects. If money is losing its value, businesses and investors are less likely to make long-term contracts. This discourages long-term investment in the nation's productive capacity.

The price theory tells us that, in a competitive market, price of a commodity is determined by the market demand for and the market supply of the commodity and that the variation in the price of the commodity, if any, is caused by the variation in the demand and supply factors. Likewise, the aggregate price level is determined by the aggregate demand and aggregate supply and variation in the aggregate price level is caused by the variations in the aggregate demand and aggregate supply (Dwivedi 2007). Limbore & Moore (2019) examined the effect of inflation rates on balance of payments using secondary data from the RBI (Central Bank of India) covering the period of 2001 to 2018. Variables employed are export, import, trade account balance, current account balance and overall balance data which were analyzed using descriptive method. The study found that inflation rate was highly unstable which negatively influenced balance of payments.

4.6: Discussion of Test of Hypothesis

Hypothesis 2

H₀: Inflation rate does not have any statistical significant impact on balance of payment in Nigeria.

From table 1 and 6 above, the probability value for inflation rate (INF) is less than 0.05. Since the p-value (INF) is less than 0.05, we reject H₀ and conclude that inflation rate has statistical significant impact on balance of payment in Nigeria.

5.0 . Summary and Conclusion

Inflation has called for crucial attention from every country, counting Nigeria for it has a pronounced influence on the domestic economy. When the inflation rate is high, it affects the drop in people's procuring power and general invention. The reduction in national production will, in turn, cause a drop in the exports and affects the balance of payments performance. However Manual and San (2019) stated that an increase in the inflation rate upsurges trade shortfall and moderates the trade surplus, exclusively in Malaysia in the span of 15 years (2000 to 2015).

Base on the empirical results in chapter 4, the summary of the findings are itemized as follows:

- The Engle and Granger co-integration result shows evidence of long run relationship between BOP and Inflation Rate in Nigeria
- Inflation rate has negative and significant impact on the balance of payment both in the short run and in the long run in Nigeria.

A demand restrain policy must be implemented whereby the level of aggregate expenditures is made to keep pace with the potential ability of the economy to produce goods and services.

Since the financing of a budget deficit does have implication for the size of the money stock, both the monetary and fiscal authorities should act together to cause a deflationary gap whenever the need for it arises.

The proceeding policy for reducing the pressure of demand could be considered along with the policy of prices and income control aimed at reducing the rate of money wage increases.

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