Effect of Inflation on Output Growth in African Oil Producing Countries.

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Abstract
Price stability as a major objective of monetary policy is acknowledged based on the fact that high inflation is detrimental to the growth of an economy and effective functioning of a market economy. This study, therefore, set out to examine the effect of inflation on output growth in African oil producing countries using annual data spanning from 1986 to 2022. The study employed panel data analysis to estimate the stated objectives of the Study. The ARDL Panel model result revealed that both in the short and the long run, money supply has significant positive relationship with Gross Domestic Product. The findings of the study also exhibited that both in the short and long run; there is insignificant negative relationship between exchange rate, interest rate and the real GDP. Government expenditure in both short and long run as well has negative impact on real Gross Domestic Product but in the long run, it is significant. Moreover, inflation has insignificant impact in both short and long run on real GDP but it maintain positive relationship in the long run while on the short run, it is negative. In line with the findings of this study, it was recommended that governments of African oil producing countries should intensify efforts to channel the income realizing from oil production into productive investments and capital projects like provision of industries and infrastructures which can create employment and wealth for the countries involved in this study.
Keywords: Inflation, Output Growth, and ARDL Panel Analysis.

1.0 INTRODUCTION

Rapid output growth and low inflation are the most common objective of macroeconomic policy across countries (Developed and Developing). Across countries, the formulation and implementation of monetary policy by the apex bank is aimed at maintaining price stability which is consistent with the achievement of sustainable economic growth (Bawa & Ismaila, 2012). It is not controversial that uncontrolled inflation has several negative effects on the economy. For instance, it imposes welfare costs on the society, impedes efficient resource allocation by obscuring the signaling role of relative price changes, discourages saving and investment about future prices, inhibits financial development by making intermediation more costly hits the poor excessively because they do no hold financial asserts that provide a hedge against inflation, and reduces a country's international competitiveness by making its exports relatively more expensive, this, impacts negatively on the balance of payment, and perhaps more importantly, reduces long term economic growth (Ghosh & Phillips, 1998; Khan and Senhadji, 2001; Billi & Khan, 2008; Frimpong and Oteng-Abayie, 2010). The study of inflation-growth nexus has probably given rise to one of the most significant macro-economic debates in the field of economics. This is because every nation irrespective of its level of economic growth is trying to pursue both internal and external balance. That is, economic growth that is not fueling inflation and balance of payment equilibrium. Meanwhile, one of the main objectives of macro-economic policy is to sustain high economic growth in relation with

low and stable inflation (Khan and Senhadji 2001). Inflation is a very strong determinant of macroeconomic development and it refers to as an increase in the general price level of the economy. Persistent increase in inflation rates in some of the oil producing countries of Africa has the tendency to reliably discourage saving and investment, and therefore, hamper productivity and output growth. It may also decrease the international competitive drive of an economy, thereby causing the country's export to be relatively expensive and further creating a negative effect on the balance of payments. Basically, economic growth is one of the essentialities of macroeconomic developments and its manifestation depends primarily on the level of capital formation. The degree of capital formation is function of savings and investment. Therefore, output growth rate is influential by the rate of inflation on savings and investment on economy. Low inflation is necessary to grease the wheels of the economy, to foster investment and promoting the efficient use of productive resources (Ahortor et.al, 2011). while high inflation harms the economy due to its undesirable re-distributional and welfare effect (Selenteng et. al, 2013).

Studying the connection between inflation and economic growth has become a perennial discussion both in theoretical and empirical literature since understanding the inflation-growth nexus is so essential for the effective conduct and implementation of monetary policy across countries (Seletang et al., 2013). However, the effect of inflation on economic growth is assumed to be linear, though, the impact of inflation can be neutral, positive or negative depending on whether money is super-neutral (Fisher, 1983).

The rest of the paper is organized in five sections. Section two is devoted to the review of related literature, while section three deals with research methods. Section four presents the results and discussion, while conclusion and recommendations are presented in the last section.

2.0 BRIEF EMPIRICAL LITERATURE

Tolga, Nilay, and Ece (2014) examined the relationship between output growth and inflation in Turkey. The study made use of GARCH model to investigate the granger causality relationship between output growth, inflation and uncertainties. The findings from the study revealed that the existence of granger causality is observed from nominal uncertainty to inflation, from nominal uncertainty to uncertainty, from output growth to real uncertainty. The study concluded that Turkish inflation is affected by the output growth through the nominal uncertainty channel.

Khayroollo (2011) used cointegration analysis and error correction model to explore the relationship between inflation and economic growth in Finland. The results of the study indicate that there is positive long-run relationship between inflation and economic growth. The study also exhibited that the economy of Finland grows at when inflation is at 4%.

Mandurapperuma used Johanson cointegration to examine the impact of inflation on economic growth in Sri Lanka using annual data of 1998 to 2015. The result found out that an increase in the general price level has been detrimental to economic growth in Sri Lanka. Kasiah (2013) examined the impact of inflation on economic growth in Tanzania. The study used correlation coefficient and cointegration technique to establish the relationship between inflation and GDP while the coefficient of elasticity was employed to measure the magnitude of responsiveness of change in GDP to changes in general price levels. The study also showed that inflation has a negative impact on economic growth. The study exhibited no to movement between inflation and economic growth in Tanzania.

Dankargere et al (2018) used cointegration test and granger causality to examine the relationship between the gross domestic product and inflation in India using annual data spanning from 1992 to 2017. The results revealed that there is long-run positive relationship

between economic growth and inflation. The policy implication is that an increase of GDP has helped to increase in the growth of the economy and inflation is beneficial to the economy.

Prasma and Gopakumar (2018) also used cointegration and error correction to investigate the relationship between inflation and economic growth in India. The findings showed that there is long-run negative relationship between inflation and growth rate in India. The study implies that inflation is harmful rather than helpful to growth.

Tugba and Yilmaz (2020) analysed the relationship between economic growth, unemployment, inflation and current account balance. The study also analysed the theoretical approach to unemployment, inflation and economic growth. The study made use of granger causality test to explore the relationship between the variables involved. The result revealed that growth has one way symmetrical causality relationship with inflation.

Chang-Shuai and Zi-Yuan (2012) used Granger Causality Test and cointegration analysis to explore the relationship between unemployment, inflation and economic growth in China. The result showed that unemployment impacted negatively on growth while inflation impacted positively on growth in China. The study revealed that no causality between unemployment and growth while there is two-way causation between inflation and growth. Hussein (2014) also used granger causality test and cointegration analysis to examine the trade- off between unemployment and inflation in Jordan for the period 1984-2011. The study exhibited that there is no trade-off between unemployment and inflation. Besides, the study found that there is no proof of causality in both directions that is inflation does not granger cause the unemployment and unemployment does not give any feedback.

Umaru and Zubairu (2012) used Granger Causality Test and cointegration analysis to analyse the relationship between inflation and economic growth in Nigeria. The study revealed that there is Uni-directional causality between inflation and economic growth. The result also exhibited positive relationship between inflation and economic growth.

Osuala et.al (2013) examined the impact of inflation on economic growth in Nigeria using granger causality test. The results showed that there exists a statistical significant positive relationship between inflation and economic growth.

Sani and Ismaila (2012) examined the threshold effect of inflation on economic growth in Nigeria. The study used quarterly time series data that covers the period between 1981 and 2009 to estimate a threshold level of inflation for Nigeria. The study adopted the threshold regression model developed by Khan and Senadji (2001) to estimate a threshold inflation level of 13 percent for Nigeria. The result indicates that below the threshold level of 13 percent, inflation has a mild effect on growth while above 13 percent, there is high magnitude of negative impact of inflation on economic growth in Nigeria.

Adaramola and Dada (2020) examined the impact of inflation on economic growth in Nigeria. The study employed ARDL as economic techniques to capture the stated objective. The study findings revealed that inflation and real exchange rate exert a significant negative impact on economic growth while interest rate and money supply indicate a positive and significant impact on economic growth.

Nell (2001) analysed the impact of inflation on economic growth. The study used VAR methodology to carry out the study. The findings of the study revealed that inflation within the simple digit zone may be beneficial to economic growth while inflation in the double digit zone tends to be detrimental to economic growth.

Amino and Anono (2012) employed granger causality and Johansen cointegration techniques to conduct a study on the relationship between unemployment, inflation and Nigerian economy between 1999 and 2009. The study revealed negative relationship between unemployment and growth. Moreso, no causal relationship between unemployment and inflation.

Bui (2013) investigated the asymmetric effect of inflation and money supply on economic growth using the Nonlinear Autoregressive Distributed Lag approach introduced by Shin,

Byungchul, and Greenwood-nimmo (2010) for Vietnam over the period 1990-2017. The empirical results provide evidence that the effects of inflation on economic growth are negative and asymmetric in the long run. The impact of money supply on growth is positive in both the short-run and long-run. Accordingly, the impact of the increase in the inflation rate is bigger than the decreasing in the long-run. This different impact is significant and high inflation will destruct economic activities.

Omoke (2010) explored the relationship between Inflation and economic growth in Nigeria. Consumer price index (CPI) was used as a proxy for Inflation and the GDP as a perfect proxy for economic growth to examine the relationship. The scope of the study spanned from 1970 to 2005. A stationarity test was carried out using the Augmented Dickey-Fuller test (ADF) and Phillip-Perron test (PP) and stationarity found at first difference at 1% and 5% level of significance. Hence, the study through the empirical findings maintain the fact that the causality that run from inflation to economic growth is an indication of relationship showing that Inflation indeed has an impact on growth.

Okoro and Kenneth (2024) examined the impact of inflation and Stagflation on the economic growth of Nigeria using annual data spanning from 2012 to 2024. The study employed the Autoregressive Distributed Lag on the selected variables, i.e. real gross domestic product (GDP), inflation rate, interest rate, exchange rate, degree of economy`s openness, money supply, and government consumption expenditures for the period. The study findings showed that inflation and stagflation has a significant negative impact on economic growth, while other variables in the model depict no influence on the economic growth of Nigeria. However, inflation and the degree of openness show no causal relationship with gross domestic product.

3.0 METHODOLOGY

The model for this study adopts the model of Khan and Senadji (2001) which took their roots from endogenous growth model with modifications. The model for this study modifies the model of Khan and Senadji (2001) with two variables such as government expenditure and interest rate. The model is thus specified below:

$RGDP = f(INF, MS, EXCR, RIR, TP, GE)$----------3.1

Explicitly, the model can be re- stated as follows:

$GDP_{it} = \alpha_0 + \alpha_1 INF_{it} + \alpha_2 MS_{it} + \alpha_3 EXCR_{it} + \alpha_4 RIR_{it} + \alpha_5 TP_{it} + \alpha_6 GE_{it} + U_t$------3.2

Where

RGDP =Real Gross Domestic Product.
INF =Inflation
MS= Money Supply
EXCR= Exchange rate
RIR= Real Interest rate
TP = Trade Openness
GE = Government Expenditure
í = entity or country, t = time or year
ηí = denote unobserved country specific fixed effect
U_{it}= denote time specific effect
U_t, ε_t= Error terms or stochastic terms
$\alpha_0 - \alpha_6$= coefficients or parameters
$\beta_0 - \beta_6$ = = coefficients or parameters

4.0 RESULTS AND DISCUSSION.

4.1: Panel Unit root

Table 4.3 Panel unit root test

Variables	IPS		ADF- Fisher Chi-Square		Philip- Perrror		Order of Integration
	t- statistics	P- value	t- statistics	P- value	t- statistics	P- value	
RGDP	-9.519	0.0000	135.778	0.0000	161.118	0.0000	I(1)
INF	-8.350	0.0000	108.836	0.0000	106.684	0.0000	I(0)
EXCR	-12.450	0.0000	172.295	0.0000	163.633	0.0000	I(1)
MS	-22.552	0.0000	324.907	0.0000	321.206	0.0000	I(1)
RIR	-8.180	0.0000	79.265	0.0000	80.920	0.0000	I(0)
TP	-20.276	0.0000	282.620	0.0000	297.328	0.0000	I(1)
GE	-20.385	0.0000	291.675	0.0000	309.179	0.0000	I(1)

From Table 4.1, the unit root test results showed that INF, and RIR are stationary at levels while other variables such as RGDP, EXCR, MS, TP and GE are made to be stationary at first difference using different unit root tests of IPS, ADF and PP. The result suggests that the variables are stationary at different orders of integration of zero (0) and one (1). This prompts the use of ARDL approach to cointegration where different order of integration is involved.
4.2 ARDL Cointegration Approach.

4.2 Panel Cointegration Testing Result

Pedroni Alternative hypothesis: Common AR coefficients (Within -dimension)				
			Weighted	
	Statistics	**Probability**	**Statistics**	**Probability**
Panel v- statistic	**12.031**	**0.000**	**2.750**	**0.003**
Panel rho-statistic	**-2.089**	**0.019**	**-0.329**	**0.371**
Panel PP-statistic	**-0.608**	**0.272**	**-2.778**	**0.0027**
Panel ADF-statistic	**-2.824**	**0.003**	**-3.209**	**0.0007**
Alternative Hypothesis: Individual AR coefs. (Between-dimension)				
	Statistics	**Probability**		
Group rho-statistic	**-0.119**	**0.453**		
Group PP-statistic	**-2.184**	**0.015**		
Group ADF-statistic	-4.130	0.0000		
Kao Test Null Hypothesis: No Cointegration				
	Statistics	**Probability**		
ADF	**2.196**	**0.0022**		

Source; Author's Computation (2024)

The pedroni's cointegration test results reported in the table 4.2 indicate that except for panel pp-statistics, all others are significant, so, the null hypothesis which is of no cointegration is rejected. The explanatory variables such as MS, EXCR, INTR, INF, TP and GE are cointegrated with GDP. Both r-ho Statistics and ADF Statistics and group PP and ADF Statistics have better properties. The null hypothesis of no cointegration is rejected at 1% and 5% levels of significance by both panel and group PP and ADF Statistics within and between respectively. Kao test also showed the existence of cointegration among the variables rejecting null hypothesis of no cointegration at 5% level of significance with t-statistic of 2.196(p = 0.0022)**.**

The section presents results of analysis conducted in this study to examine the effect of inflation on output growth in African oil producing countries. Estimation result of panel ARDL is presented for African oil producing countries. Results presented in the table 4.3 below notably indicate that pooled mean group estimation in preferred based on the result of Hausman 1978 test.

Table 4.3 Hausman Test

Null hypothesis	Test statistics (chi)	Probability
Difference in coefficient not systematic	1.49	0.9603

This test compared pooled means group estimation result with the mean group estimation result under the null hypothesis that difference in coefficient is not systematic. As reported in the table, the chi-square statistics stood at 1.49 alongside probability rate of 0.960 which connote that there no enough evidence to reject the null hypothesis in coefficient of the mean group estimation is not systematic, hence the pooled mean group is valid for this study. Thus, the Panel ARDL estimation is based on the pooled mean group option as presented in table 4.4 below:

4.4: ARDL APPROACH FOR AFRICAN OIL PRODUCING COUNTRIES.

Table 4.4: Panel ARDL Estimation.

Dependent variable (RCDP)

Long run estimate

Variable	Coefficient	Standard error	Z-test	Probability
INF	0.3685	0.2274	1.62	0.105
MS	0.3067	0.1336	2.30	0.022
EXCR	-0.0103	0.01014	-1.02	0.310
RIR	-1.7610	0.7682	-2.29	0.222
TP	-0.0610	0.0523	-1.17	0.243
GE	-1.4903	0.4313	-3.46	0.001

Short Run

INF	-0.1188	0.1186	-1.00	0.317
MS	0.9370	0.60417	1.55	0.021
EXCR	-0.2996	0.09013	-3.32	0.211
RIR	-0.1154	0.1253	-0.92	0.357
TP	0.0546	0.1709	0.32	0.749
GE	-1.4591	1.3285	-1.10	0.272
CON	0.4845	2.9937	0.16	0.871

The table 4.4 revealed that both in the short and the long run, money supply has significant positive relationship with gross domestic Product. This implies that money supply is capable of enhancing economic growth in African oil producing countries. The results of the study also showed that both in the short and long run, there is insignificant negative relationship between exchange rate, interest rate and the real GDP. Government expenditure in both short and long run as well has negative impact on real gross domestic product but in the long run, it is significant. Inflation has insignificant impact in both short and long run on real GDP but it maintains positive relationship in the long run while on the short run, it is negative.

5.0 CONCLUSION AND POLICY RECOMMENDATIONS

This study investigated the effect of inflation on output growth in African oil producing countries. The results of ARDL estimation revealed that both in the short and the long run, money supply have significant positive relationship with gross domestic Product. This implies that money supply is capable of enhancing economic growth in African oil producing countries. The results of the study also showed that both in the short and long run, there is insignificant negative relationship between exchange rate, interest rate and the real GDP. Government expenditure in both short and long run as well has negative impact on real gross domestic product but in the long run, it is significant. Inflation has insignificant impact in both short and long run on real GDP but it maintains positive relationship in the long run while on the short run, it is negative. Based on the foregoing findings in this research, the following recommendations are made: Governments of African oil producing countries should intensify efforts to channel the income realizing from oil production into productive investments and capital projects like provision of industries which can create employment and wealth for the countries involved in this study. There is need to put in place stable exchange rate system which can encourage local production. Governments of African oil producing countries should have a stable and uniform exchange rate which can minimize the cost of production in oil sector and reduce the rate of inflation in all the oil producing countries of Africa.

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