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ADVANCES IN GLOBAL SERVICES AND RETAIL MANAGEMENT

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Nigeria's Economic Management: Reflections Through Monthly Interest Rate Movement From 1996 to 2020 and Beyond

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Abstract

Economic management is the rules, policies, procedures and skills deployed to manage the resources, finances, income, and expenditure of a community, business enterprise or a whole country. The major instruments of economic management are the fiscal and economic development policies normally outlined in the countries budget by the President. The failure to achieve the stated objectives in the fiscal and monetary policies are the major challenges faced by less developed and developing countries of the world. This is because of frequent fluctuations in macro-prices particularly interest, wage and exchange rates. The resultant effects of the movement of these prices are reflected in the inflation and the GDP growth rates which adversely affects agribusiness activities. In this study, the trend of the movement of monthly inflation rate between 1996 and 2020 in Nigeria was investigated. The data, which were obtained from the records of the Central bank of Nigeria, National Bureau of Statistics as well as the World Bank's World Development Indicators, were analyzed using descriptive statistics as well as cubic, spline and smoothing methods. The results, which showed Nigeria's average inflation for the period under study to be 12.42%, was better managed during civilian administrations (with a mean of 11.8%) but was higher than most countries of the world. Among the smoothing methods, Holt-Winters predicted (1996-2020) and forecast (2020-2042) Nigerian inflation better than other methods with a mean forecast of 11.25. Among the presidents, the Goodluck Jonathan era witnessed the most stable inflation regime with a mean of 10.2%. The results further reveal that a stable inflation is capable of increasing agriculture GDP by 1.0885% yearly although only short-run dynamics is apparent. It is recommended that more technical skills rather than guesswork policies should be deployed by the government to better manage the inflationary trend so that Nigeria could return to single-digit inflation regime that was once achieved.

Introduction

Economic management is the rules, policies, procedures and skills deployed to manage the resources, finances, income, and expenditure of a community, business enterprise or a whole country. The major instruments of economic management are the fiscal and monetary policies.

The fiscal policies are renewed periodically, in most cases yearly, and contained in the budget estimates for the country by the President. The practice differs considerably from country to country, but in Nigeria, the main fiscal policies indicate the official exchange rate of the Nigerian Naira (NGN) to the United States Dollar (USD) which all official transactions would be conducted, the estimated price of crude oil, the quantity of crude that would be produced and other vital projections expressed in the Medium-Term Expenditure Framework (MTEF). The actual budget contains statements of expected revenue and their allocation between recurrent and capital items in Ministries, Departments and Agencies (MDAs). On the on other hand, monetary policies have to do with exchange rate, interest rates, credit, banking regulations and other policies meant to stabilize the economy and insulate it from external shocks. In Nigeria, the Monetary Committee of the Central Bank of Nigeria meets quarterly and reviews key performance indicators of the economy and then outline changes for the upcoming quarter. The resultant effects of these various policies are reflected in certain key indicators, most especially, the inflation rate. A rise in inflation means lower purchasing capacity for the citizens whereas, a fall will normally give more power to national currency and hence a boost in local economic activities. The main sectors of Nigerian economy are the oil and gas and agriculture sectors. Other sectors are manufacturing, solid minerals, services and others.

The dominant sector is the oil and gas which makes up 70% of the revenues (especially foreign inflows to Nigerian economy) accruing to the government for driving the development of the country and so any change in either the exchange rate and/or crude prices have marked impacts on other sectors of the economy, especially, agriculture. If there is fall in revenue from oil and gas or there is fall in the exchange rate, the government tries to maintain and stabilize the revenue inflow by devaluation of the NGN which subsequently raises prices thereby increasing inflation rate and hence slow down economic activities. One of the direct consequences might be a fall in investment in agribusiness activities and then a fall in GDP contribution from agriculture. The problem of increase inflation rate is a clog in the wheel of growth of any economy and investments environment. Due to the fact that this challenge affects the return on investment, discourages savings and inhibits growth of the Nigerian economy on its path to structural transformation (Akpaeti et al., 2019). Continued rise in inflation could result into recession which Nigeria experienced from 2015-2017. In order to stabilize the economy, a mix of policies are therefore used to bring the economy out of recession. In this study, a critical analysis of the trend in inflation from month to month as a performance indicator of the managers of Nigerian economy was undertaken with a view to ascertain if the desired targets of economic stability could have been achieved given the prevailing interest rates. The aim of this research is to assess the overall performance of Nigerian governments and the various policies since 1960 on the trend of inflation in Nigeria. The objectives are to:

1. Determine the trend of Nigerian inflation since 1996 and estimate various models to capture it,
2. Compare the Nigerian inflation to other regions/blocks as well as with various global income groups as defined by the World Bank from 1960 to 2019,
3. Compare the inflation under civilian and military regimes from 1996 to 2020,
4. Compare the performance of inflation under succeeding presidents from 1996 to 2020,
5. Determine the effect of inflation on the agribusiness activities in Nigeria here proxied by agriculture, forestry, and fishing value added (% of GDP) from 1960 to 2019, and,
6. Forecast Nigerian inflation to 2042 (which is roughly equal to the period of the data).

Literature Review

The challenge of macroeconomic management is to alter established policies in light of changing domestic and worldwide economic circumstances. What is required is pragmatism and flexibility. Given the current uncertainties, accentuation ought to be put on rationalizing the current policy framework. To begin with and first, governments must guarantee macroeconomic stability through sound monetary, fiscal, and exchange rate policies. Within such a framework of macroeconomic steadiness, it is essential to adjust price distortions in order to provide an environment for the best possible use of resources. A great data framework is fundamental for all aspect of economic management. Precise alterations in policies and programs is vital in a fast changing world. As a rule, better information especially about key performance indicators bring greater dividends for economic management such as techniques of long-term inflation rate forecasts which are exceptionally basic (Udoh & Isaiah, 2018). Inflation is irrefutably one of the foremost driving and energetic macroeconomic issues standing up to most economies of the world and has ended up a driving subject of dialog among researchers. A stylized truth on the trend of Nigeria inflation uncovered that Nigeria was confronted with serious inflationary weights in 1995 which reached its peak at 79.9% due to high monetary growth and fiscal expansion (Bawa & Abdullahi, 2012; Udoh & Isaiah, 2018; Agenor & Montiel, 1996; Jha, 1994) which diminished to 6.6% in 1999 amidst rapid changes as a result of rapid expansionary measures.

Several researchers have employed different models in an attempt to study Nigeria inflation. Studies by Bawa et al. (2016) analyzed Nigeria's inflationary trend from 1981 to 2015 using the bounds test, otherwise called Auto-Regressive Distributed Lag (ARDL). The study indicated that inflation inertia, rainfall and money supply significantly influence the inflationary process in Nigeria. ARDL is a combination of several procedures which otherwise were separate analysis previously and is widely used to establish long and short-run relationships between some economic variables used for forecasting. Another model, Auto-Regressive Integrated Moving Average (ARIMA {p, d, q}), is used to determine the inherent structure of a time series data as an aid to forecasting (Chinonso and Justice, 2016; Inam, 2017). The role of agribusiness has become important within the context of the challenges that worldwide economy faces in enhancing food production. In the view of Khan (2012); Oyinbo and Rekwot (2014), the effect of agribusiness on inflation is both coordinate and indirect. The direct effect of agribusiness is obvious within the frame of food inflation. The indirect effect of agribusiness on inflation is reflected within the rise in the cost of living emerging from high food inflation leading to higher wages, which, in turn, contributes to generalized inflation through higher cost of production.

Methods

The study is about Nigeria which is a tropical country in sub-Sahara Africa (SSA) located between 4o and 14o N and 3o and 14o 30' E in the west coast (Figure 1). Nigeria is a leading member of the Economic Community of West African States (ECOWAS) and one of the strongest economies in Africa. The country is currently under a civilian administration which was inaugurated in 1999 after a long military rule between 1966 to 1999 interlaced with some periods of civilian rule (1979-1983, 1991). Nigeria, regarded as the giant of Africa, is also one of the most populous country in the Africa but has witnessed quite a number of policy somersaults and reversals making consistent progress towards a prosperous and developed country difficult.

Figure 1: Map of Nigeria
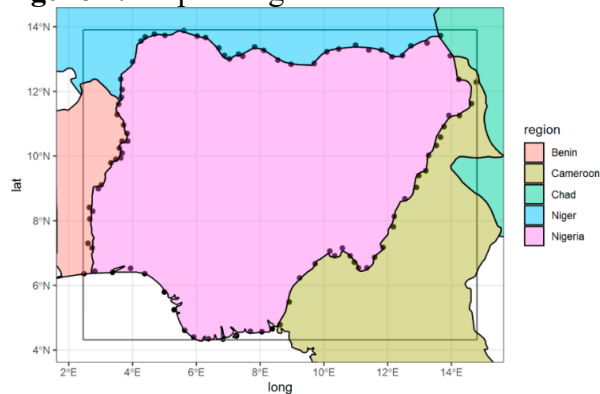
Source. Pebesma (2018); Wickham (2016).

Sample

The study covers the period 1960 to 2020 using secondary data. However, only annual data of inflation rate is available for the period 1961 to 1995, therefore the detailed analysis is from 1996 to 2020, the period in which the monthly inflation rate data is available.

Data Collection

The data utilized in this study were obtained from the records of the Central Bank of Nigeria (CBN, 2003-2010), National Bureau of Statistics NBS], (NBS, 1996-2020) and the World Bank's World Development Indicators [WDI], (The World Bank, 2017).

Empirical Model

The data were analyzed using descriptive statistics, Holt-Winters and Smoothing splines, Polynomial splines with or without knots as wells as Auto-Regressive Distributed Lag (ARDL) modelling. Additional estimations were done by using the terms of each Presidents as knots while the change between civilian and military forms of administration were also used as knots. The monthly average inflation rates were computed from the period 2007 - 2020 and presented in a graph. The average inflation rate (1961-2019) for Nigeria was compared with economic and political blocks of the world and the results presented in graphs. Various models (linear, double log, growth, smoothing splines, Holt-Winters smoothing) were estimated for the period 1996-2020 and the resulting estimated models were used to forecast inflation to 2042. The compound growth rates of inflation over the study period were determined in line with Nmadu (2009) as stated in eq.

1. $r = (e^b - 1)x100$ (1)

Where: b is the coefficient of the model specified in eq. 2.

$$S_V = ae^{bt}$$ (2)

Eq. 2 becomes linear or the growth equation if log is applied to both sides as stated in eq. 3.

$$lnS_V = a + b_t + u$$ (3)

Subsequently, the doubling time is obtained using eq. 4.

$$D_T = 55.2/r \tag{4}$$

Note that 55.2 is the 2018 estimate of life expectancy of a Nigerian by WHO used in the place of the original value of 69 in the model for doubling time (Nmadu et al., 2015), the life expectancy of an American. The compound growth rate and doubling time were computed monthly from 2007-2020 to depict the changes as inflation rates changes. The coefficient of the quadratic term in the model as specified in eq. 5 shows whether the inflation is accelerating, decelerating or stagnant (Nmadu, 2009)

$$lnS_V = a + b_t + c_t^2 + u \tag{5}$$

ARDL is a modelling system that combines endogenous and exogenous variables in the determination of the nature of short-run and long-run dynamics that exist among and between some variables (Menegaki, 2019). The major advantage of ARDL over cointegration modelling is the fact that it can handle variables of different order (see Nmadu and Amos, 2009 for step-by-step determination of the order of integration). It is also more efficient in situation of small and finite sample data sizes and gives an unbiased long-run estimates. ARDL is of the general form as presented in eq. 6.

$$Y_t = \beta_o + \sum_{i=1}^{p} \beta_1 Y_{t-i} + \sum_{i=0}^{q} \beta_j X_{t-i} + \xi_t \tag{6}$$

Where Y_t is a vector of the dependent variable in time t, X_t is a vector of the various explanatory variables in time t, p is the lag order of the dependent variable, q is the lag order of the explanatory variables which may be mixed, βs are the parameters of the model and ξ_t is a vector of the error term assumed to be well-behaved (normally, identically, and independently distributed-niid). Two scenarios i.e. intercept with no trend as well as unrestricted intercept with unrestricted trend, were estimated in order to capture their effects on the dependent variable. In addition, the estimation was done with each variable serving as the dependent variable. All the analyses were carried out in R (R Core Team, 2019) and the document was prepared using markdown (Allaire et al., 2019).

Findings

The results of the various analysis and estimations are presented in the following sections. After the presentations, the results are adequately discussed and the implications are pointed out. The observed monthly inflation rates are presented in Figure 2 while the monthly trend is presented I n Figure 3. The monthly average from 2007 - 2020 is presented in Figure4, the average inflation rate for the entire period as compared to other world continents/political groups is presented in Figure 5 while the average as compared to global economic blocks is presented in Figure 6. The overall mean for the entire period is 12.42%. The results presented above shows that Nigerian inflation rates have remained consistently high and also witnessed some periods of spikes except for September – November where things were relatively stable. The average rates were on the downward trend until the most recent recessionary pressures significantly raised the average. The comparison with other countries and continents shows that Nigeria's inflation rates are quite higher

than all developed continents. The worst cases of inflation are Latin America and the Caribbean as well as SSA. In addition, Nigeria's inflation does not compare favorably with other economies (developed and developing) and is quite higher than high income ones as shown in Figure 6. It could, however, be observed that it is far better to compare countries with similar economies rather than countries within geographical locations. These results are in consistent with the findings of Shafiu (2018) who affirmed that other countries like South Africa are doing better than Nigeria in managing inflation. According to Shafiu (2018), in 2004 inflation rate in Nigeria was around 17-18% while South Africa had inflation rate of about 0.2%. Thirteen years later, in 2017, Nigeria inflation rate stood at 16.5% and South Africa was able to stabilize her inflation rate at 5.3%.

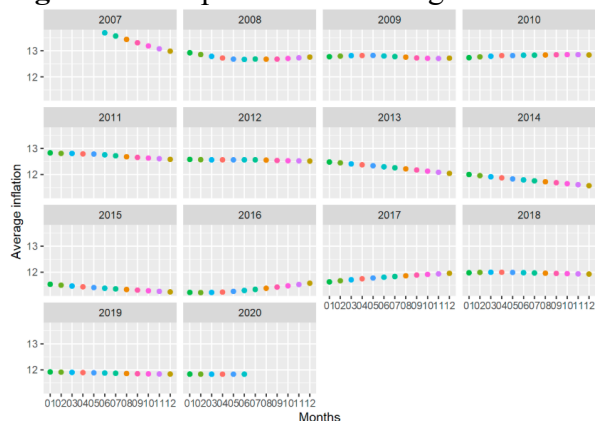**Figure 2:** Compete Picture of Nigeria's Inflationary Movement

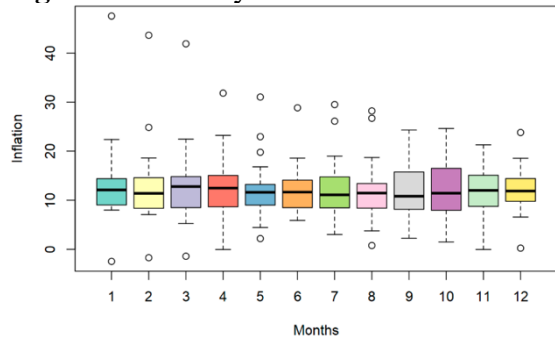**Figure 3:** Monthly Trend of Inflation Rate in Nigeria (1996 - 2020)

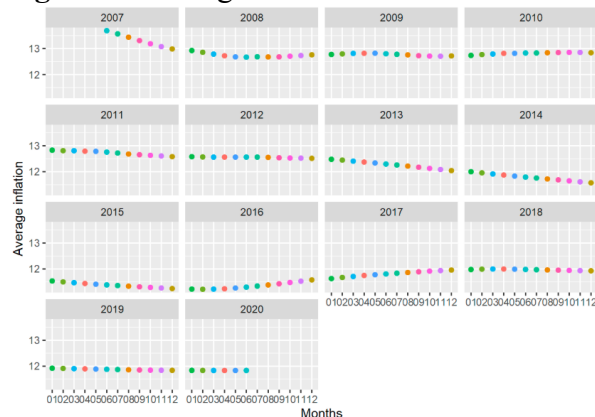**Figure 4:** Average Inflation Rates From 2007 to 2020

Figure 5: Compression Between Nigeria and Regional/Global Blocks of the World
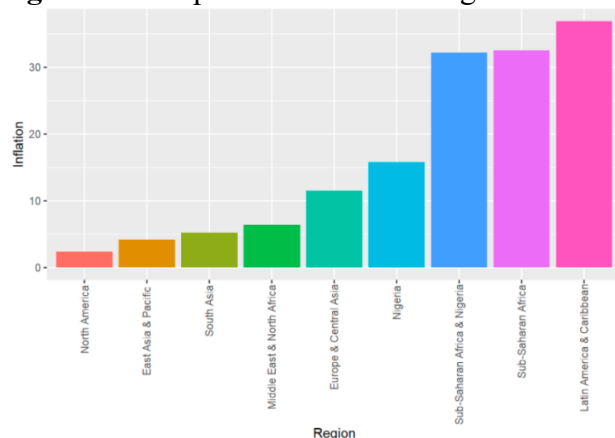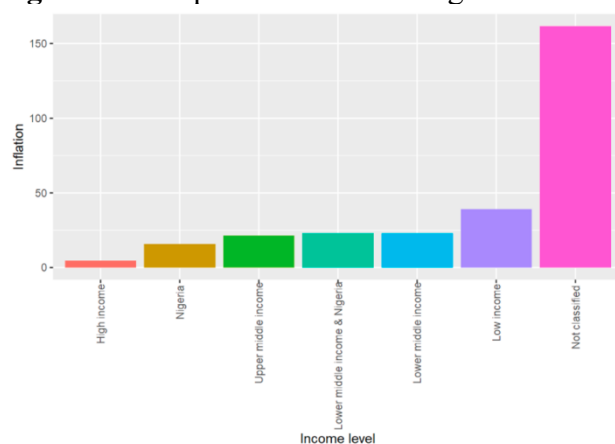

Figure 6: Comparison Between Nigeria and Other Income Groups Globally

The average inflation rate under the different Presidents of Nigeria from 1996 to 2020 is shown in Figure 7 while the average inflation under Civilian and Military regimes since 1996 is presented in Figure 8. The results indicated that performance of the individual presidents did not show a preference. Although the best performance was under Goodluck Jonathan, there was a military president that performed better than civilians. This goes to show that the performance of individual presidents is subject to the type of technocrats and bureaucrats (especially the economic management team and the CBN governor) employed to manage the economy. This is in accordance with the findings of Umez (2000) who revealed that democratic process is preferable to a military regime because when democratic principles are enforced it provide a more stable environment for investments and therefore likely to promote economic growth. Lending credence to this, Umaru et al. (2014) pointed out that on the average GDP is higher during democracy than during the military regime and inflation rate on the average is higher during the military than during democracy. Table 1 shows the estimated coefficients of the various models estimated on inflation rate in Nigeria. Figure 9 shows the estimated trend while Figure 10 shows the predicted trend of inflation in Nigeria. The results in Table 1 reveals that all the included parameters were significant is capturing the variation of Nigerian inflation over the period under study except the growth term. In terms of the adjusted R^2, the best model is the smoothing splines without knots while the growth model was the poorest. However, the results in Figure 9 reveals that only the Holt-Winters and those models with knots seems to be more appropriate in terms of historical tracing of the observed

inflation. In addition, the results in Figure 10 were a very poor prediction of the estimated models, indication that the models, although acceptable, did not predict the observed inflation accurately. This does not in any case make the models useless, notwithstanding.

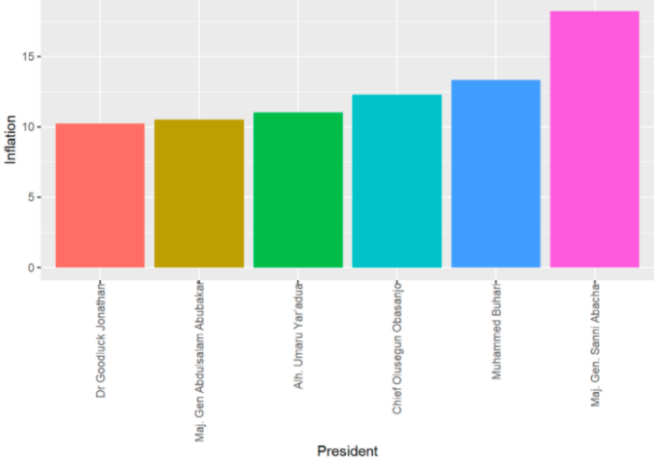**Figure 7:** Nigerian Inflation Management Under Different Presidents

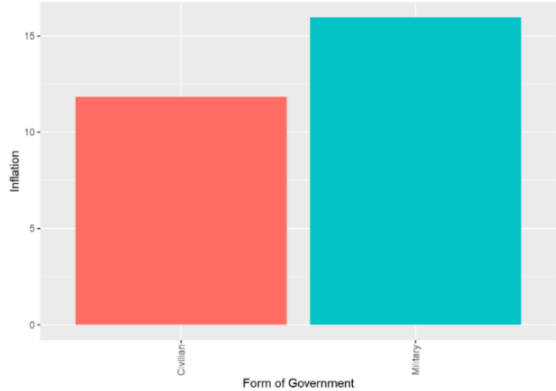**Figure 8:** Nigerian Inflationary Movement Under Different Styles of Governance

Figure 9: Estimated Trend of Inflation Using Various Forecasting Models
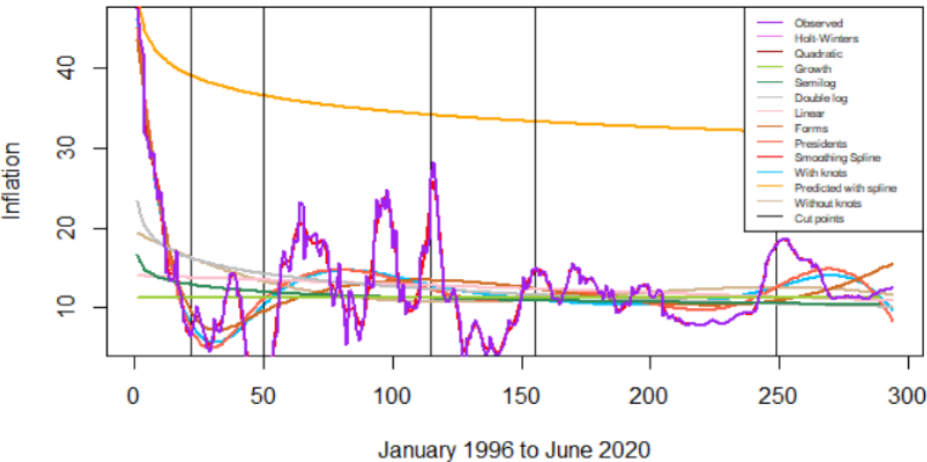
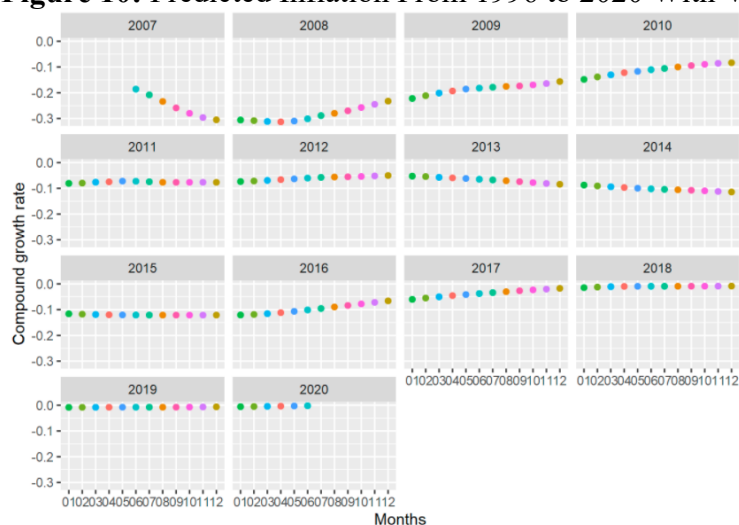**Figure 10:** Predicted Inflation From 1996 to 2020 With Various Forecasting Models

Table 1: Estimates of the Linear and Polynomial Model With Various Joint Points

	Without Knots	With Knots	Presidents	Forms of government	Linear	Semilog	Double log	Growth	Quadratic
(Intercept)	19.454 ***	46.111 ***	45.134 ***	43.606 ***	13.997 ***	23.479 ***	2.810 ***	2.424 ***	2.604 ***
	(1.394)	(2.630)	(2.413)	(1.965)	(0.732)	(1.713)	(0.156)	(0.064)	(0.095)
bs(jks, knots = jjs)1	-16.820 ***	-25.058 ***	-30.730 ***	-40.817 ***					
	(4.031)	(4.401)	(4.780)	(2.670)					
bs(jks, knots = jjs)2	-3.494	-46.753 ***	-44.555 ***	-17.582 ***					
	(2.566)	(2.860)	(2.577)	(2.546)					
bs(jks, knots = jjs)3	-7.873 ***	-27.808 ***	-23.176 ***	-42.568 ***					
	(2.199)	(3.368)	(3.200)	(3.079)					
bs(jks, knots = jjs)4		-33.486 ***	-37.453 ***	-27.934 ***					
		(2.905)	(2.805)	(2.164)					
bs(jks, knots = jjs)5		-35.818 ***	-31.310 ***						
		(3.117)	(2.818)						
bs(jks, knots = jjs)6		-36.561 ***	-40.380 ***						
		(3.241)	(3.071)						
bs(jks, knots = jjs)7		-30.099 ***	-24.879 ***						
		(3.138)	(3.125)						
bs(jks, knots = jjs)8		-36.493 ***	-36.849 ***						
		(3.228)	(2.955)						
jks					-0.011 *	-2.355 ***	-0.083 *	-0.000	-0.004 *
					(0.004)	(0.357)	(0.032)	(0.000)	(0.001)
I(jks^2)									0.000 *
									(0.000)
adj.r.squared	0.082	0.525	0.539	0.469	0.017	0.127	0.019	-0.003	0.015
statistic	9.687	41.435	43.828	65.822	6.191	43.442	6.488	0.003	3.196

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

##Estimates of the Holt-Winters smoothing model

	Alpha	Beta	Gamma	a	b	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12
Estimates	0.86	0.03	1	12.66	0.03	0.79	1.35	1.66	1.9	1.98	1.98	1.37	0.35	-0.61	-1.02	-0.8	-0.1

Figure 11 presents the monthly compound growth rate of inflation in Nigeria from 2007 to 2020 while Figure 12 shows the doubling time of inflation in Nigeria from 2007 to 2020. The results in Figure 11 shows that inflation has been growing at a negative rate since 2007 although there was a sharp rise in 2008 which is as a result of some devaluation following the economic crisis at the time but the results show that the recovery from that rise started in 2013 until another rise in 2016 following the economic recession the country slipped into. The result shows that Nigeria is yet to recover from that rise till present. The doubling time had remained at around zero since 2007 but declined sharply in 2017 and the decline has continued till June 2020. The decline towards the

9

negative trend seems to suggest that the inflation rate Nigeria is experiencing now should have been a thing of the past since in ideal situation, inflation rate of about 2% is beneficial to the economy. Perhaps, what this means is that the policies being employed to fight inflationary trend are being mismatched with current economic theories. The coefficient of the quadratic term seems to indicate that Nigerian inflation is accelerating although the rate of acceleration is extremely low (at almost 0%). It is an indication that with right actions and policies, the inflation should decelerate towards an acceptable rate that is beneficial to Nigerian economy. This is in accordance with the findings of Akpaeti et al. (2019) who found out that Nigerian inflation rate during the period of review (1980-2016) has a positive growth rate of 4.74 percent which indicated that at a long run, the growth rate will bring about a negative impact on agricultural investment and productivity in the country. Table 2 shows the estimated coefficients of the impact of inflation on the agriculture GDP and vice versa indicating the short-run dynamics and the long-run relationship between the two variables. The results show that there is only short-run dynamics between inflation and agriculture GDP and vice versa. The result further shows that the impact of inflation on GDP or vice versa lacks the increased agribusiness activities especially value chain development. This is in consistent with the results of Khan and Qasim (1996) who found that inflation is co-integrated with import price and real GDP. According to their findings, food inflation also has long run relationship with value
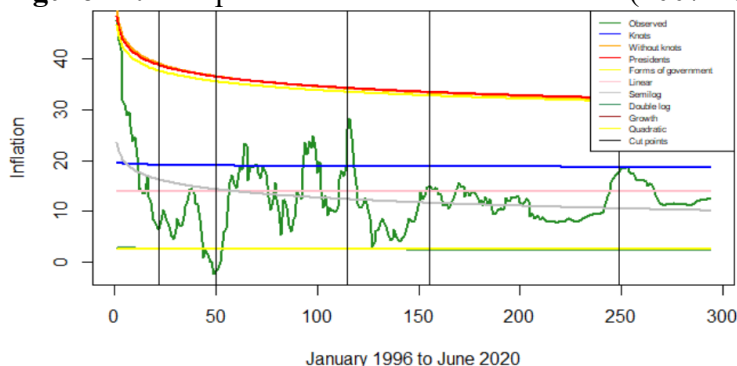
Figure 11: Compound Growth Rate of Inflation (2007-2020)

January 1996 to June 2020

Figure 12: Estimated Doubling Time of Inflation (2007-2020)
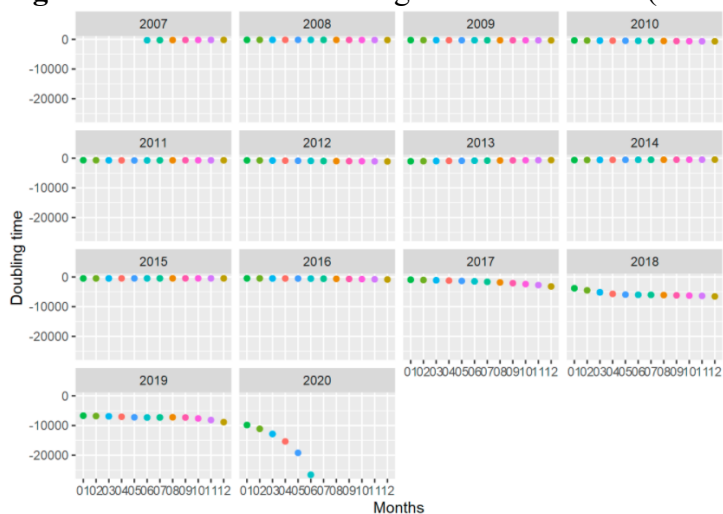
Table 2: Coefficients of the ARDL Model

	Trend-inflation	No Trend-Inflation	Trend-GDP	No Trend-GDP
(Intercept)	3.792	3.792	0.966	0.966
	(3.227)	(3.227)	(1.055)	(1.055)
L(Inflation, 1)	0.596 ***	0.596 ***	0.022	0.022
	(0.110)	(0.110)	(0.044)	(0.044)
GDP	0.266	0.266		
	(0.413)	(0.413)		
L(GDP, 1)	-0.101	-0.101	0.894 ***	0.894 ***
	(0.409)	(0.409)	(0.056)	(0.056)
Inflation			0.028	0.028
			(0.044)	(0.044)
adj.r.squared	0.387	0.387	0.840	0.840
statistic	13.198	13.198	102.217	102.217
*** p < 0.001; ** p < 0.01; * p < 0.05.				

Table 3 shows the summary of forecast from the various models while Figure 13 and Figure 14 shows the monthly forecasts comparing models and months from 2020 to 2042. The complete monthly forecasts using the various models is presented in Figure 15 and Figure 16 shows the mean forecast from the various models. Among the models adjudged to have estimated inflation more accurately, Holt-Winters seems to be the best forecast (Figure 14). This is in contrast to Hanif and Malik (2015) who indicated that ARDL forecast Pakistan inflation better than other forecasting models. But the forecast suggests that Nigerian inflation is likely to be at two digits level to 2042. It is imperative that new management skills, a more robust collaboration between the fiscal and monetary authorities as well as a strong leverage on research and development on the appropriate policy mix and match to bring the inflation below two digits in order to spur agribusiness activities towards industrialization and economic prosperity is the critical need. This is in accordance with the findings of Akpaeti et al. (2019) who pointed out that inflation rate must be monitored and curtailed to a single digit inflation rate so that growth can be sustained.

Table 3: Summary Statistics of the Various Forecasts

	Base	Knots	No. Knots	Spline	Presidents	Government	Linear	Semilog	Double Log	Growth	Quadratic	Holt Winters
Minimum	-1.70	5.67	10.67	-2.8	5.0	7.14	11.106	10.29	10.446	11.229	10.315	-5.36
Maximum	47.98	46.11	19.45	48.0	45.1	43.61	13.986	23.48	16.612	11.293	13.464	27.80
1. Quartile	8.37	10.54	11.06	8.4	10.6	10.48	11.826	10.97	10.691	11.245	10.461	8.33
3. Quartile	15.26	13.51	12.51	15.1	13.7	12.98	13.266	13.53	11.652	11.276	11.760	14.44
Mean	12.49	12.40	12.46	13.0	12.4	12.28	12.546	12.62	11.358	11.261	11.178	11.41
Median	11.82	11.57	12.00	12.2	11.6	11.59	12.546	11.92	11.042	11.261	10.906	10.99
SE Mean	0.39	0.29	0.12	0.5	0.3	0.28	0.051	0.14	0.059	0.001	0.051	0.33
LCL Mean	11.72	11.83	12.22	12.0	11.8	11.74	12.446	12.34	11.241	11.259	11.078	10.76
UCL Mean	13.27	12.98	12.69	14.0	13.0	12.82	12.646	12.89	11.475	11.263	11.278	12.07
St. dev	6.46	4.82	1.98	8.2	4.9	4.52	0.836	2.27	0.976	0.019	0.834	5.47
Skewness	1.57	3.95	1.77	1.8	3.7	4.27	0.000	1.70	2.069	0.038	0.897	0.13
Kurtosis	5.78	20.72	2.58	5.1	18.6	21.76	-1.213	3.39	5.377	-1.190	-0.240	0.54

Figure 13: Monthly Forecast of Nigerian Inflation (2019-2042) Using Different Forecasting Models

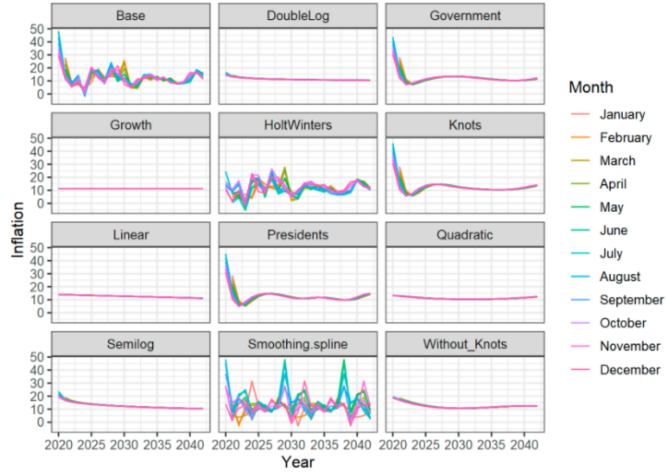**Figure 14:** Forecast of Nigerian Inflation (2019-2042), Comparing Different Models by Months

Figure 15: Complete Picture of Forecast Inflation With Different Models
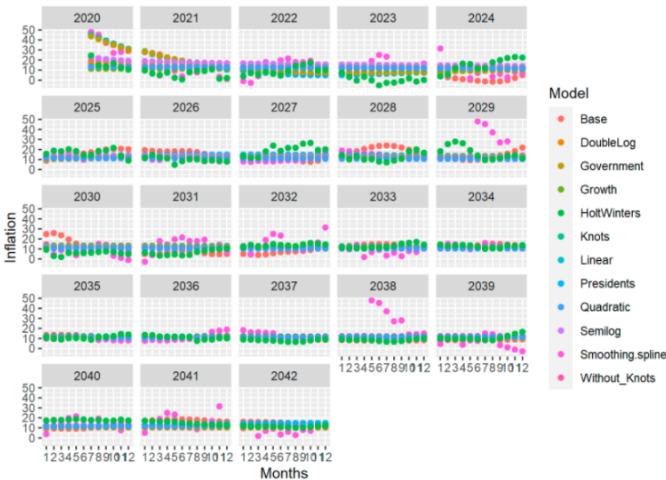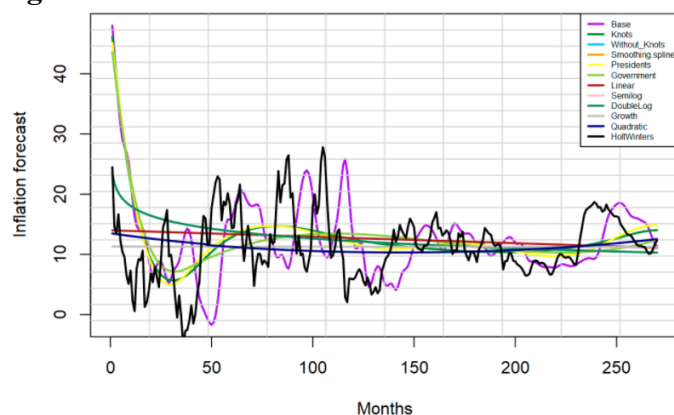
Figure 16: Mean Forecasts of the Models From 2019 to 2042

Conclusions

This study has clearly demonstrated the monthly inflation of Nigeria since 1996 till date and further shown that unless a new strategy would be employed, the inflation rate is likely to remain high, above 10% as it has been since 1996. Further, it was shown that a stable inflation, can lead to about 1.0885% annual increase in Agriculture GDP. However, the style of management has shown that even with the current practice, a stable inflation rate is plausible. Part of the problems inherent in the management of inflation, and hence the larger economy is the employment of assumptive and guesswork policies rather than using empirical knowledge and results from careful modelling and analysis to run the system. In most cases, policy formulators are always in a hurry to showcase their achievement in a short-time and never patient to initiate long-term policy measures. Frequent reversals, summersaults and termination of running policies are also the bane of stability and development in Nigeria. In view of the above, more robust technical and management skills, more robust collaboration between the fiscal and monetary authorities as well as a strong leverage on research and development (R&D) activities on the appropriate policy mix and match to bring the inflation below two digits in order to spur agribusiness activities towards industrialization and economic prosperity is critical and should be deployed by the government to better manage the inflationary trend so that Nigeria could return to single-digit inflation regime that was once achieved. Finally, there is need to the policy formulators allow policy maturity, perhaps, through the act of the national Assembly, and avoid to rush to show quick results. Let posterity be the guide and the judge.

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