Innovations

Inflation Targeting and Economic Growth in Nigeria

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Abstract: *This study analyzed the inflation targeting and economic growth in Nigeria. The specific objectives were to, ascertain the impact of inflation on Nigeria's economic growth; estimate the threshold effect of inflation on economic growth in Nigeria; determine the effect of inflation targeting on Nigeria's economic growth. The variables were economic growth as the dependent variables while fixed capital formation; human capital index; inflation rate; broad money supply and exchange rate were the independent variables. Autogressive Distributed Lag (ARDL) method of data analysis was used. The study also employed unit root test, bound cointegration test, Serial Correlation, normality test and Hetroscedasticity. From the analysis result the study found that; Inflation has a significant impact on Nigeria's economic growth; there is threshold effect of inflation on economic growth in Nigeria; Inflation targeting does have a significant effect on Nigeria's economic growth. More realistic effort is necessary by the monetary authorities to target inflation strongly by reducing inflation to a single digit as contained in the economic recovery growth plan. Inflation threshold need not be necessarily the inflation target, the inflation objective for monetary policy should be set lower than the inflation threshold. Monetary authorities should make a more practical effort to manage inflation forcefully in order to avert its negative effects by assuring a bearable rate that would boost Nigeria's economic growth*

Keywords: fixed capital formation; human capital index; inflation rate; broad money supply and exchange rate

1.1 Introduction

The main goal of macroeconomic policies in both developed and developing countries is economic growth. The importance of economic growth in lowering poverty and creating jobs is the reason for its high attention, and nearly every nation in the world has voiced concerns about how it can enhance human well-being. Todaro and Smith (2011) noted that an economy is deemed to be growing if there is a sustained increase in a country's real gross domestic product over a specific period, which is typically accompanied by an expansion of its labor force, capital stocks, consumption, and volume of trade. Fratzscher, Grosse-Steffen and Rieth (2020) defined economic growth as a sustained increase in the real output of the economy in a given period.

Achieving non-inflationary economic growth has been a major challenge for modern economies, as price stability has been closely associated with economic growth because it contributes to high levels of economic activity and employment by improving the transparency of the price mechanism (Ojo, 2013). Ahmed, (2024) noted that in a stable price environment, people can make well-informed decisions about investments and consumption in addition to efficient resource allocation. The failure of traditional macroeconomic stabilization policies to keep the general level within the desired limit has highlighted the reason why inflation is being targeted (Ahmed, 2024). Chimobi, (2024) and Ahmed, (2024) have noted that inflation distorts resource allocation in the economy and disproportionately harms the poorest members of society, creates uncertainty, arbitrarily redistributes income and wealth, undermines macroeconomic stability, and makes sustained rapid growth impossible. Although economists have differing opinions regarding inflation targeting as a tool for economic growth, most economists agree that low and stable inflation is crucial for market-driven, sustainable economic growth, and that monetary policy is the most direct tool for controlling inflation. Additionally, of all the tools available to the government for influencing and guiding the economy, monetary policy has been shown to be the most adaptable tool for reaching medium-term stabilization goals.

Inflation targeting, or IT, was first adopted and implemented in New Zealand in the early 1990s and has since gained popularity as a monetary policy framework widely used by several countries as their main framework in the pursuit of non-inflationary growth of the economy. The primary rationale for adopting IT is the need to minimize the negative effects of inflation on economic growth (Ojo, 2013). Al-Taeshi, (2023) reports that more than 30 countries are using an inflation-targeting monetary policy framework. A number of countries have adopted the IT framework under a

variety of circumstances, from a well-planned switch from a different policy regime (New Zealand, Canada) to the resolution of a currency crisis (United Kingdom). Inflation targeting is an economic policy in which the Central Bank estimates and publicly announces a targeted inflation rate and then attempts to steer the actual inflation towards the targeted range through the use of interest rate changes and other monetary policy instruments (Ndoricimpa, 2023). Therefore, inflation targeting is more than just setting a specific numerical goal. Ndoricimpa, (2023) defines inflation targeting as a modern monetary policy strategy that consists of five key elements: (i) an information-inclusive strategy that determines the setting-up of policy instruments based on a variety of variables, not just monetary aggregates or the exchange rate; (ii) an institutional commitment to price stability as the main objective of monetary policy, with other objectives being subordinated; and (iii) increased transparency of the monetary policy strategy through communication with the public. Setting an inflation target requires deciding on the target level. Gopakumar, (2024) notes that the target can be characterized as a range, a single point, or a ceiling, and that a fixed single point target is much harder to achieve than a range or ceiling. A range or ceiling can provide the Central Bank with some flexibility and allow for flexibility in the event of unexpected price shocks. Inflation targets for 2005 and 2010 were 10.0% and 11.2%, respectively, while actual rates for 2020 and 2021 were 12.30% and -2.10%, respectively, while target rates were 17.16% and 16.79%. For instance, Table 1.1 demonstrates that the actual rate of inflation was 51.6% in 1995, the target rate was 9% in 2000, and the actual rate also decreased to 14.5% with a positive differential of 61.41%.

Table 1.1: Inflation Targets from 1990 to 2021

Year	Actual	Target
1990	3.6	***
1995	51.6	15.00
2000	14.5	9.0
2005	11.6	10.0
2010	11.8	11.2
2011	10.3	12.0
2012	12.0	9.5
2013	8.00	9.9
2014	8.00	7.50
2015	9.60	8.00
2016	18.60	11.90
2017	15.40	10.71

2018	11.40	13.00
2019	11.98	11.74
2020	12.30	17.15
2021	-2.10	16.79

***Policy statement is specified as significantly reduce/moderate the rate of inflation
Source: CBN (2021)

Inflation can have both positive and negative effects on an economy, according to many economists (Ahmed, 2024;). For example, structuralists argue that inflation is essential for economic growth, while monetarists argue that inflation is harmful to it (Clarke, Jandik, & Mandelker, 2014). The debate began in the 1950s, with a focus on emerging countries that had long struggled with slow growth rates, rising inflation, and widening balance-of-payments deficits.

Because inflation reduces incentives for labor and production, distorts the efficiency of the market process in allocating resources, undermines the international competitiveness of domestic industries, and reduces the potential for economic growth, monetarists argue that price stability protects the balance of payments and encourages economic expansion. Monetarists argue that stable prices are the foundation of economic growth, and that both stabilization with growth and stabilization without growth are viable policy options for a country (D'Acunto, Hoang & Weber, 2022). They also argue that inflation hinders economic growth by decreasing domestic and international savings, degrading the balance of payments, and compromising the efficiency of resource allocation

Structuralists argue that inflation is not the only factor contributing to economic problems in emerging nations, but rather that it is a normal part of economic development in developing countries because supply-side structural rigidities and bottlenecks prevent the elastic supply of some basic commodities, such as housing, energy, food, and transportation; as income rises, demand for these necessities will increase, resulting in price increases (Baranowski, Doryń, Łyziak, & Stanisławska, 2021). Therefore, structuralists held that inflationary pressures and a decline in the balance of payments were inextricably linked to economic growth, meaning that in developing nations, there would be a trade-off between inflation and economic growth, leading to a decline in the balance of payments. Reducing economic expansion may require job losses if a developing nation wants to stabilize it's pricing and balance of payments (Ayunku & Etale, 2015, Ahmed, 2024).

Since the 1990s, Nigeria's inflation rate has remained mostly in the double digits, which has caused the Central Bank of Nigeria (CBN) to be very concerned about

controlling inflation. As Table 1.1 illustrates, Nigeria had its worst inflationary experience in 1995, when it recorded an inflation rate of 51.6%. According to CBN (2019), the inflation rate fell to 8.0% in 2013 and 2014, but this decline was not maintained, as it increased to 9.60%, 18.60%, 15.40%, 11.40%, and 11.98 in 2015, 2016, 2017, 2018, and 2019 respectively. There is no empirical agreement on the ideal inflation rate; the rule of thumb is 5% for developed countries and roughly 10% to 11% for developing countries (Obi & Uzodigwe, 2016). However, the relationship between inflation and economic growth has been translated into the use of threshold models, which suggest that higher inflation becomes immediately very detrimental to growth when it exceeds the threshold, a result that would require immediate policy changes as soon as inflation exceeds the threshold (Doguwa, 2012, Obi & Uzodigwe, 2016).

After years of concentrated research and debate, the topic of inflation targeting and economic growth has remained active, garnering significant attention from academic and policy circles. The lack of agreement on the topic has resulted in a renewed interest in the debate for Nigeria.

1.2. Research Objectives

The main objective of this study is to examine the inflation targeting and economic growth in Nigeria. The following are specific objectives
i. To ascertain the impact of inflation on Nigeria's economic growth.
ii. To estimate the threshold effect of inflation on economic growth in Nigeria.
iii. To determine the effect of inflation targeting on Nigeria's economic growth.

Literature Review

2.1 Keynesian Theory of Inflation

Keynes proposed the Keynesian theory of inflation, which was popularized by his followers. According to Ireland (2009), the investment-saving mechanism is how the Keynesian theory of inflation operates. He went on to say that there are two Keynesian inflation theories: demand-pull theory and cost-push theory. While Keynes described the demand-pull theory as an "inflationary gap" in his book "How to Pay for War" (Keynes, 1940), the cost-push theory was incorporated in his "General Theory" (Keynes, 1936). Excess demand, according to Keynes' demand-pull theory, is the immediate cause of inflation. The excess money supply was not emphasized by Keynes as a cause of excess demand. There could be multiple sources of demand. More goods and services for consumption are desired by consumers. More investment inputs are desired by businesspeople. To meet the

country's civic and military needs, the government wants more goods and services. Consumption, investment, and government spending all contribute to aggregate demand. The inflationary gap occurs when the value of aggregate demand exceeds the value of aggregate supply at full employment. The greater the disparity between aggregate demand and aggregate supply, the faster inflation will occur. Rising money incomes at full employment would result in an excess of aggregate demand over aggregate supply, resulting in an inflationary gap, assuming a steady average propensity to save. As a result, Keynes employed the concept of the inflationary gap to demonstrate price inflation.

Without overtly putting the expansion of the money supply into focus, Keynes explains inflation with the help of surplus demand and shows the development of the 'inflationary gap'. Excessive investment over saving, according to Keynes, causes an inflationary gap, which leads to inflation. As a result of inflation, saving is increased, and investment is equalized. As a result, an inflationary gap indicates a lack of savings to sustain investment. Saving refers to the release of consumer products that can be used by people who are engaged in capital production. When investment exceeds saving, however, some people who produce capital products will be unable to earn a living. As a result, the demand for consumer products will outstrip the supply, resulting in an inflationary gap. This disparity will not close unless rising prices decrease real incomes of wage earners with a stronger tendency to consume and transfers this difference in income to profit earners with a higher tendency to save, hence increasing saving. This is accomplished through an increase in the price level. The price level will continue to climb, resulting in more saving and a narrowing of the inflationary gap until saving equals investment. When saving and investment are equal, the inflationary gap closes, and the price level stabilizes.

Cost-push inflation, according to Keynes' general theory, occurs when the cost of production rises fast while demand for those products and services remains constant. These additional production costs will be added to the price of goods and services, which will be passed on to the consumer, resulting in a rise in selling prices. If the method of production and the size of the capital stock remains unchanged, a change in the money wage rate will alter the cost schedule by altering the employers' expenditure in producing a certain level of output, and thus the minimum necessary expenditure by the people on the goods produced as expected by the employers will also change, as will the actual expenditure by the people on the goods produced as expected by the employers. If the money wage rate remains constant, the price level can only fluctuate due to decreasing returns when employment increases or the profit-push imposed by the oligopolists.

2.2. Empirical Literature

Meni and Kimunio, (2024) investigated the effectiveness of inflation targeting in stabilizing food prices by examining its impact on food price volatility and the broader economic factors influencing this instability, including global commodity prices, exchange rate fluctuations, climate variability, and regional conflicts. Inflation targeting, introduced by the Central Bank of Kenya in 2011, aims to control inflation and stabilize prices. The study adopted non-experimental research design with secondary quarterly time series data from 2011 to 2022 sourced from the Central Bank of Kenya, Kenya National Bureau of Statistics, and the Food and Agriculture Organization, this research analyzes factors including the Consumer Price Index, exchange rates, and food prices using a Vector Error Correction Model (VECM). The findings indicate that, while inflation targeting has succeeded in controlling overall inflation, it has struggled to reduce food price volatility. This suggests the need for more comprehensive policies that go beyond traditional monetary strategies to stabilize food prices effectively. The results highlight the necessity for a multifaceted approach involving monetary, fiscal, and trade policies to manage food price dynamics, improve food security, support farmers' incomes, and enhance overall economic stability in Kenya.

Aannerud and Friman, (2024) assessed the effectiveness of inflation targeting in promoting economic growth is crucial for policymakers in determining appropriate monetary policy measures. Given the lack of consensus regarding the impact of inflation targeting on economic growth, it prompts the question of whether inflation targeting indeed exerts a significant effect on economic growth. This bachelor's thesis investigates the impact of inflation targeting on economic growth in developed countries over a 29-year period from 1991 to 2019. Using a methodology that accounts for both static and dynamic economic growth relationships, we analyze data from 45 developed countries, some employing inflation targeting and others not. Our findings suggest a positive effect of inflation targeting on economic growth in the static model, but autocorrelation issues necessitate the use of a dynamic model. The utilization of two distinct types of dummy variables yielded disparate outcomes compared to those obtained from the static model. Results from dynamic modeling indicate a slight negative effect of inflation targeting on economic growth. Together these results point to an inconclusive effect of inflation targeting on economic growth.

Ikram, Mohamed and Sami (2023) determined whether inflation targeting could improve economic growth and financial stability in 35 emerging economies of which 19 inflation-targeting and 16 non-inflation-targeting countries over the 1995–2017 period. To this end, we first determine the preconditions needed to adopt the inflation targeting regime using the Qualitative Comparative Analysis method

(QCA). We then construct a Financial Stability Index (FSI) for emerging markets using a Principal Components Analysis (PCA). Finally, we determine the impact of shocks on economic growth and financial stability in inflation-targeting and non-inflation-targeting countries through a Panel VAR model estimated using the GMM method. The results show that some structural and institutional preconditions, should be set up during the pre-adoption period. In addition, the results indicate that the inflation-targeting regime allows emerging countries to control their economic growth and financial stability in the event of shocks to a greater extent than non-targeting countries, although the magnitude of the shock persists only in the short run, given that economic and financial conditions return to their normal state in the long run.

Combes, Kaba and Minea, (2024) looked at the effects of inflation targeting on firm performance. Using a panel of 31,027 firms in 47 developing countries over the period 2006-2020, this paper. Estimations performed using entropy balancing to address endogeneity in policy adoption reveal that inflation targeting significantly increases firm performance, mainly measured by sales growth and productivity growth. This effect is robust to a wide range of tests (including alternative models, measures, and samples), and may vary under different macroeconomic and firms' structural characteristics. Lastly, by looking at possible transmission channels, we reveal that these favorable effects seem related with the capacity of the inflation targeting framework to reduce macroeconomic instability.

Ozili, (2024) identified the important success factors for an effective inflation targeting monetary policy regime in Nigeria. The identified success factors include the size or number of economic agents monitoring the inflation target, the credibility of the central bank, the degree of central bank independence, reduction in budget deficit, limited dollarization of the Nigerian economy, effective central bank communication, avoidance of fiscal dominance, financial development, greater financial inclusion, financial stability, and insecurity caused by farmer-herder clashes and terrorism.

Achiyaale, et. al. (2023) examined the extent to which inflation targeting and inflation volatility impact on economic growth from an emerging economy's perspective. Annual data from the World Development Indicator (WDI) and the Bank of Ghana (BoG) from 1985 to 2014 were used for the study. The data was interpolated into quarterly series using E-views. The stationarity characteristics of the variables were tested using the Augmented Dickey-Fuller and the Phillip-Perron unit root tests. The GARCH (1 1) and ARDL models were employed for the analysis. The study found that inflation targeting had a positive significant effect on economic growth in Ghana.

Also, despite the volatile nature of inflation in Ghana, inflation volatility had no significant effect on economic growth. This scholarly work would aid policy makers in policy formulation pertaining to inflation targeting and inflation volatility on economic growth. It will also open up the circles of knowledge regarding inflation targeting monetary policy's regime in empirical literature, institutions of higher learning and the understanding of the general public. The study recommends that the Bank of Ghana maintains its current monetary policy framework-Inflation targeting, but should strengthen the preconditions and subsequent requirements of the monetary policy in order to maximize the gains to economic growth.

Islam and Ahmed, (2023) examined inflation targeting: a time-frequency causal investigation. The study adopted the frequency scales methodology that paves the way for a meticulous exploration of the intricate causal interplay between these pivotal macroeconomic variables for twenty-two developing economies using monthly data from 1992 to 2022. Traditional literature on causality tends to focus on short- and long-run timescales, yet our study posits that numerous uncharted time and frequency scales exist between these extremes. These intermediate scales may wield substantial influence over the causal relationship and its direction. Our research thus extends the boundaries of existing causality literature and presents fresh insights into the complexities of monetary policy in developing economies. Traditional wisdom suggests that central banks should raise interest rates to combat inflation. However, our study uncovers a contrasting reality in developing economies. It demonstrates a positive causal link between the policy rate and inflation, where an increase in the central bank's interest rates leads to an upsurge in price levels. Paradoxically, in response to escalating prices, the central bank continues to heighten the policy rate, thereby perpetuating this cyclical pattern. Given this observed positive causal relationship in developing economies, central banks must explore structural and supply-side factors to break this cycle and regain control over inflation.

Iloegbu, & Atueyi, (2020).investigated the effect of government expenditure on economic growth in Nigeria within a period of 33years spanning (1987-2019). Data collected were from the Central Bank of Nigeria(CBN) Statistical Bulletin, where government expenditure on agriculture, government expenditure on health, government expenditure on education as the independent variables and real gross domestic product as the dependent variable. Multivariate model was developed in this analysis and Ordinary Least Square (OLS) regression analyze was used for the analysis, The Unit root test, co-integration approach and error corrections model were used for the analysis. It was also revealed from the result of our estimated model that government expenditure on education has a positive and insignificant

impact on the Nigerian economy. It was also discovered that government expenditure on health has a positive and significant impact on the Nigerian economy. It was also discovered that government expenditure on agriculture has a positive and significant impact on the Nigerian economy. The study recommend that CBN should do more to encourage borrowing by bringing the lending rate to single digit to boost agricultural production in the rural settings.

Research Methods

3.1 Model Specification

To examine the influence of IT on economic growth as well as unveil the existence of a non-linear relationship between inflation and economic growth in Nigeria, quadratic function was used to estimate the threshold level or the turning point above which inflation exerts a negative effect on economic growth in the case of Nigeria. Most empirical studies have used the threshold endogenous model developed by Sarel (1996). However, this model requires a large set of data to make valid statistical inferences. Thus, given the relatively small size of the sample in the present study (51 observations), and following Rutayisire (2015), the following quadratic function was used in the present study to account for the non-linear relationship between inflation and growth:

$$GDP = f(GCF, HCI, INF, INF^2, DD, DD*INF, M2, EXR) \qquad 3.2$$

The full econometric version of Equation 3.2 with log transformation becomes:

$$LGDP = \beta_0 + \beta_1 LGCF + \beta_2 LHCI + \beta_3 LINF + \beta_4 LINF^2 + \beta_5 DD + \beta_6(DD*LINF) + \beta_7 LM2$$

$$+ \beta_8 LEXR + \mu \qquad 3.3$$

Where $LGDP$ = log of real gross domestic product; $LGCF$ = log of gross fixed capital formation; $LHCI$ = log of human capital index; $LINF$ = log of inflation rate; $LINF^2$ = log of squared inflation rate; DD = IT dummy; $DD*LINF$ = interaction term (product of IT dummy and log of inflation rate); $LM2$ = log of broad money supply; $LEXR$ = log of exchange rate; β_0 = intercept term; β_1 - β_8 = parameter estimates, and μ = random error disturbance.

In Equation 3.3, it is expected that the linear term of inflation ($LINF$), have a positive sign and is designed to reflect the beneficial effects of low inflation on real GDP ($LGDP$), while the squared term of inflation ($LINF^2$) is expected to have a negative sign and should measure the adverse impact associated with higher inflation. Since the squared term increases in value faster than the linear term, it implies that the

presence of negative effects of inflation will eventually outweigh the positive effects. Moreover, the combination of a positive and significant linear term with a negative and significant squared term suggests that the impact of inflation on real GDP can be described as an inverted U-shaped curve, meaning that the positive effects of inflation switches to negative when inflation exceeds a threshold level. NB: $LINF^2 = 2LINF$, so that $\beta_4 LINF^2 = 2\beta_4 LINF$.

3.2. *A priori* Specification

The *a priori* expectation of the relevant variables of the model are summarized in Table 3.1.

Table 3.1: Summary of *A priori* Expectation

Variable	Coefficient Symbol	Expected Sign
LGCF	β_1	+, $\beta_1 > 0$
LHCI	β_2	+, $\beta_2 > 0$
LINF	β_3	+, $\beta_3 > 0$
$LINF^2$	β_4	-, $\beta_4 < 0$
DD	β_5	+, $\beta_5 > 0$
DD*LINF	β_6	+, $\beta_6 > 0$
LM2	β_7	+, $\beta_7 > 0$
LEXR	β_8	+, $\beta_8 > 0$

3.4 Estimation Technique

Prior to estimating the model, the stationarity characteristics and order of integration of the pertinent time series was ascertained using the Augmented Dickey-Fuller (ADF) and Philip-Perron (PP) unit root techniques. It is well recognized that any model estimation including non-stationary time series hardly ever yields actionable economic policy. The usage of first difference-stationary time series before estimating economic models resulted from the necessity of covariance stationary data for the statistical foundation of contemporary time series analysis and the fact that the majority of economic time series exhibit substantial trends. As pointed out by Engle and Granger (1987), even though economic series may wander over time, economic theory often provides a rationale why certain variables should obey equilibrium constraints. In other words, there may exist some linear combinations of variables that, overtime, converge to equilibrium. The series are considered to be cointegrated if each non-stationary economic series becomes stationary after differencing yet their linear combination is level-stationary. However, the cointegration test developed by Engle and Granger (EG) does not demonstrate the

existence of several cointegrating vectors. What's more, their test is based on a super convergence finding and often uses the OLS to generate the estimates of the cointegrating vector. In addition, different arbitrary normalization may, in practice, change the findings of the EG test. These OLS estimates will vary depending on the arbitrary normalizing inherent in the choice of the left-side variables for the regression equation (Nwaobi, 2001).

In contrast, Johansen (1988), and Johansen and Juselius (1990) provide an alternative procedure for examining the question of cointegration in a multivariate setting. The Johansen approach yield maximum likelihood estimators of the unconstrained cointegrating vector, as well as allows one to explicitly test for the number of cointegrating vectors. This approach does not rely on an arbitrary normalization, and test of certain restrictions suggested by economic theory such as the signs and magnitude of the estimated parameters may also be conducted (Hafer & Jansen, 1991; Nwaobi, 2001). In the light of the foregoing, this study will employ the Johansen cointegration test for determining the existence of a longrun relationship between the dependent and independent variables. The Johansen cointegration test is based on estimating the following vector autoregressive (VAR) model:

$$Z_t = A_1 Z_{t-1} + - - - - + A_p Z_{t-p} + \beta Y_t + \mu_t \qquad\qquad 3.4$$

Where Z_t is a k-vector of non-stationary variables; Y_t is a d-vector of deterministic variables; and μ_t is a vector of innovations.

3.3   Nature and Sources of Data

The study utilize annual secondary time series data spanning from 1981 to 2022. The choice of data period coverage is based on availability of data as well as to cover both pre- and post-IT eras. With a total of 42 observations, the estimation will have adequate degree of freedom (df) that improves statistical inferences.   Thus, estimates based on this data coverage not only ensure consistency of results but also guarantee robustness of results to different diagnostics tests.   These secondary sources of data for this study were sought through the following sources, including World Bank data from 1981-2022.

s/n	Variables	Sources
1	Real Gross Domestic Product (LGDP):	CBN
2	Gross Fixed Capital Formation (LGCF):	CBN
3	Money Supply	CBN
4	Exchange Rate	CBN
5	Human Capital Index	World bank index

Presentation and Analysis of Result

4.0 Presentation of Data

The raw and logged data for this study were presented in the appendix I & II respectively. The data was logged to present the data in the same based before it was use for the analysis. Another reason is to achieve normality.

4.1 Unit Root Test

The time series variables when used in their natural form, often leads to spurious regression results and this misleads policy makers. In other not to obtain spurious result the variables were first tested for stationary by employing the Augmented Dickey Fuller test (ADF). The Result obtained from the analysis is presented in the table below

Table 4.1 Unit Root Result

Variables	ADF	Integration	Significance
RGDP	-8.131994	3 (2)	1%
GFCF	-9.700939	2 (1)	1%
HCI	-7.502730	2 (1)	1%
INF	-6.327872	2 (1)	1%
INF^2	-6.474062	2 (1)	1%
DD	-4.479375	2 (1)	1%
MS	-4.604681	1 (0)	1%
EXR	-4273233	2 (1)	1%

Source: E-view 11 version.

From the result in table 4.1 above, it is well observed that money supply is integrated at level 1(0), furthermore, gross fixed capital formation (GFCF), human capital index (HCI), inflation rate (INF), inflation rate square (INF^2), inflation targeting dummy (DD) and exchange rate (EXR) were all integrated at first difference (1). However real gross domestic product were integrated at second difference (2)

This implies that all the variables are stationary at level, first differencing and second differencing with ADF values are higher than their critical values at 1%, 5% and 10% significance level. More so, because of the differences in the oder of integration the research will conduct bound test for co-integration.

4.2 Co-integration Test

The second step is the testing of the level of co-integration between the variables, order that is if in the long run two or more variables move closely together, it implies a long run equilibrium relationship as the difference between them is not stationary. A lack of co-integration suggests that such variables have no long-run relationship.

From the table above, it is obvious that study's variables were stationary at different orders, of levels, 1(1) and 1(2), i.e. at first difference and at levels. It is safe for the study to employ bound test approach to validate or substantiate for the presence or otherwise of Co-integration, thus the study runs Autoregressive Distributed Lag (ARDL).

ARDL Bounds Test
Date: 03/24/24   Time: 00:21
Sample: 1983 2022
Included observations: 40
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	6.228076	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5

2.5%	2.6	3.84
1%	2.96	4.26

Source: Researchers Compilation (2024) Using E-Views 9

Tables above elaborate the result of the ARDL bound test approach to Co-integration. Obviously, the result discovered the presence of co-integration among subsisting variables. The f-statistics value of 6.228076 is greater than the lower and upper bound values at 5% level of significance. This therefore shows there is abundant evidence proving the presence of a long-run equilibrium nexus between inflation targeting and economic growth in Nigeria within the study period of 1981 and 2022

Table 5: Model of the long Run Relationship between inflation targeting and economic growth in Nigeria

Cointegrating Form

ARDL Cointegrating And Long Run Form
Dependent Variable: LRGDP
Selected Model: ARDL(1, 2, 0, 1, 1, 0, 1, 1, 1)
Date: 03/24/24 Time: 01:07
Sample: 1981 2022
Included observations: 40

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LLGFCF)	0.101471	0.108481	0.935377	0.3593
D(LLGFCF(-1))	0.194289	0.090734	2.141305	0.0431
D(HCI)	0.107509	0.127279	0.844676	0.4070
D(INF)	-0.001331	0.000915	-1.455059	0.1592
D(LINF2)	0.010528	0.010362	1.016019	0.3202
D(LDD)	-0.002870	0.032637	-0.087922	0.9307
D(INF * DD)	0.000000	0.000001	0.351540	0.7284
D(LMS)	0.013556	0.015339	0.883775	0.3860
D(EXR)	-0.000337	0.000268	-1.258322	0.2209
CointEq(-1)	-0.129274	0.052432	-2.465553	0.0216

Cointeq = LRGDP - (-1.9664*LLGFCF + 0.8316*HCI - 0.0253*INF + 0.3744
    *LINF2 -0.0222*LDD -0.0000*DD*INF + 0.6264*LMS + 0.0021*EXR +
    8.1700)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLGFCF	-1.966448	1.233976	-1.593587	0.1247
HCI	0.831642	0.925187	0.898891	0.3780
INF	-0.025335	0.012396	-2.043813	0.0526
LINF2	0.374379	0.175933	2.127959	0.0443
LDD	-0.022197	0.247940	-0.089527	0.9294
DD*INF	-0.000009	0.000006	-1.400091	0.1748
LMS	0.626447	0.152504	4.107731	0.0004
EXR	0.002103	0.001992	1.055786	0.3020
C	8.170039	0.579259	14.104284	0.0000

Table 7 has a coefficient of error correction of -0.129274 and the corresponding probability value of 0.0216. The coefficient is rightly signed (negative) with p.value less than 0.05 level, indicating a statistically significant speed of adjustment. This means that changes in inflation targeting will eventually return on a normal trend in the long run. The coefficient indicates about 12% of the deviations of the economic growth in Nigeria due to inflation rate instability can be corrected within a year. This implies that the inflation rate targeting variables (GFCF, HCI, DD, MS, and EXR) can be used to stabilise the economic growth.

The nature of the long run relationship is explained by the coefficient of the long run model as shown:

LRGDP =-1.9664*LLGFCF + 0.8316*HCI -0.0253*INF + 0.3744 *LINF2 -0.0222*LDD - 0.0000*DD*INF + 0.6264*LMS + 0.0021*EXR + 8.1700

The results show the coefficients indicate that gross fixed capital formation, inflation rate domestic debt has a negative coefficient, while human capital index, inflation

square, money supply and exchange rate has a positive coefficient.. This study shows that inflation rate has negative significant effect on economic growth of Nigeria, while inflation rate square poses a positive significant effect on economic growth of Nigeria, money supply has a significant positive effect economic growth of Nigeria and the probability of inf, inf^2 and money supply are less than 0.05% level of significance. Variables like human capital index, inflation targeting dummy and exchange rate are greater than 0.05% level of significant, this make them insignificant determining inflation rate targeting at the long-run.

Table 6: Model of the short Run Relationship between inflation targeting and economic growth in Nigeria

Dependent Variable: LRGDP
Method: ARDL
Date: 03/24/24   Time: 00:45
Sample (adjusted): 1984 2022
Included observations: 39 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): LLGFCF HCI INF
LINF2 LDD DD
    *INF LMS EXR
Fixed regressors: C
Number of models evaluated: 196608
Selected Model: ARDL(1, 3, 1, 1, 1, 0, 1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LRGDP(-1)	0.855874	0.048753	17.55549	0.0000
LLGFCF	0.050085	0.104618	0.478743	0.6373
LLGFCF(-1)	-0.248431	0.130222	-1.907746	0.0709
LLGFCF(-2)	0.084618	0.130713	0.647359	0.5248
LLGFCF(-3)	-0.232713	0.097923	-2.376490	0.0276
HCI	0.169101	0.127277	1.328611	0.1989
HCI(-1)	-0.134400	0.113338	-1.185832	0.2496
INF	-0.001403	0.000882	-1.590447	0.1274
INF(-1)	-0.001320	0.000852	-1.549613	0.1369
LINF2	0.008531	0.010308	0.827681	0.4176
LINF2(-1)	0.030501	0.009888	3.084607	0.0058

LDD	0.014510	0.038915	0.372864	0.7132
DD*INF	1.100008	5.720007	0.019243	0.9848
DD(-1)*INF(-1)	-1.320006	4.680007	-2.819747	0.0106
LMS	0.007068	0.014567	0.485216	0.6328
LMS(-1)	0.079860	0.025794	3.096079	0.0057
EXR	-0.000362	0.000245	-1.474917	0.1558
EXR(-1)	0.000740	0.000249	2.974990	0.0075
C	1.256318	0.450127	2.791029	0.0113

R-squared	0.799390	Mean dependent var	10.41540
Adjusted R-squared	0.788842	S.D. dependent var	0.581491
S.E. of regression	0.019790	Akaike info-criterion	4.700762
Sum squared resid	0.007833	Schwarz criterion	-3.890308
Log likelihood	110.6649	Hannan-Quinn criter.	-4.409978
F-statistic	182.1570	Durbin-Watson stat	2.574271
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model
        selection.

The result of the short run effect of inflation targeting and economic growth as measured by per RGDP is shown on Table 10. From the ARDL, the coefficient of the dependent variable (LGDP) introduced as an endogenous variable in the model showed a positive value at lag 1 but

Table 10 further revealed that gross fixed capital formation (GFCF) has positive relationships at current period, and lag 2. Then negative relationship in lag 1 and lag 3. However, only the lag 3 short run result has significant effect. Lag 1 and lag 3 has negative significant effect on economic growth in Nigeria. This suggests that a unit change in gross fixed capital formation (GFCF) would bring about a change in economic growth in Nigeria.

More so, human capital index showed a positive relationship at current year, and negative relationship at lags 1, both lags exhibit a negative relationship

respectively. However, the p.value indicated insignificant effect in both the lag 1, lag current lags. This indicates that human capital index has a insignificant positive effect on economic growth in Nigeria.

Again inflation rate was found to have a negative relationship with economic growth at current year, and lag 1, The p.values show that the value for both period are statistically significant. However, This suggests that inflation for both current and first period are statistically insignificant on economic growth.

However, inflation targeting dummy (DD) showed positive relationship with economic growth at current year. The probability value is greater than 0.05 in current periods. This indicates that inflation targeting dummy has no significant positive effect on economic growth of Nigeria in the current

Further revealed that interaction between inflation targeting dummy and inflation rate (DD*INF) has positive relationships at current period, 2. Then negative relationship in lag 1. However, only the lag 1 short run result has significant effect on economic growth in Nigeria. This suggests that a unit change in interaction between inflation targeting dummy and inflation rate (DD*INF) would bring about a change in economic growth in Nigeria.

However, money supply (MS) has positive relationships at current period, Then positive at lag 1. However, only the lag 1 short run result has significant effect on economic growth in Nigeria. This suggests that a unit change in money supply (MS) would bring about a change in economic growth in Nigeria.

However, exchange rate (Exr) has negative relationships at current period, Then positive at lag 1. However, only the lag 1 short run result has significant effect on economic growth in Nigeria. This suggests that a unit change in exchange rate (Exr) would bring about a change in economic growth in Nigeria.

On the overall, the coefficient of determination (R2) revealed that about 79% of the change in inflation rate targeting can be explained by economic growth in Nigeria. This is confirmed by a significant p.value of 0.0000 from the F-statistics (182.15). The Durbin-Watson statistics of 2.574271 suggests that the result is reliable. The results have shown that inflation rate targeting variables have a short run significant effect on economic growth in Nigeria.

Table 7 Threshold Regression Analysis

Dependent Variable: LRGDP
Method: Threshold Regression
Date: 12/01/24   Time: 03:07
Sample (adjusted): 2001 2022
Included observations: 22 after adjustments
Threshold type: Bai-Perron tests of L+1 vs. L sequentially determined
    thresholds
Threshold variable: LRGDP(-20)
Threshold selection: Trimming 0.15, , Sig. level 0.05
Threshold value used: 9.758153

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRGDP(-20) < 9.758153 -- 8 obs				
INF	-0.029032	0.010145	-2.861643	0.0104
C	10.84817	0.138627	78.25444	0.0000
9.758153 <= LRGDP(-20) -- 14 obs				
INF	-0.052152	0.022263	-2.342559	0.0308
C	11.61065	0.227194	51.10449	0.0000

R-squared	0.886747	Mean dependent var	10.86121
Adjusted R-squared	0.867872	S.D. dependent var	0.337106
S.E. of regression	0.122536	Akaike info-criterion	1.197854
Sum squared resid	0.270272	Schwarz criterion	-0.999482
Log likelihood	17.17639	Hannan-Quinn criter.	-1.151123
F-statistic	46.97881	Durbin-Watson stat	1.602626
Prob(F-statistic)	0.000000		

Threshold regression analysis is a non-linear time series model analysis that allows rigid switching, by rigid switching i mean when someone wants to look at how inflation rate has affected economic growth and want to categorise inflation rate into different regime, regime of low and high inflation rate in Nigeria. This threshold analysis will help us to isolate low inflation rate and high inflation rate in Nigeria, on the process we can established linear or non-linear relationship among the variables. Looking at the result above in table 7, it was observe that the threshold regression is 9.7 which is automatically selected by the e-view soft ware This implies that inflation rate below 9.7 has negative (-0.029032) effect on the economic growth, while the inflation rate above 9.7 (-0.052152) has also negative effect on economic growth. Basically when the inflation rate is high it has more negative effect on the economy than when it is low From the analysis we can conclude that there is a linear or threshold relationship between inflation rate and economic growth of Nigeria because the two division of inflation rate give us the same negative sign.

4.4 Post-Estimation Test

4.4.1 Breusch-Godfrey Serial Correlation Lm Test

This serial correlation test was used to check for the serial relationship between the variables. The null hypothesis stated absence of serial correlation while the alternative hypothesis states the presence of serial correlation. The prob.chi square if less than 5% level of significance signifies the acceptance of the alternative and rejection of null hypothesis while the prob chi square greater than 5% level of significance signifies the acceptance of the null hypothesis and rejection of the alternative hypothesis. The full part of the result can be found in appendix

Tables 4.2.13 Interpretation of Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.101725	Prob. F(2,21)	0.0660
Obs*R-squared	9.121564	Prob. Chi-Square(2)	0.0105

Sources: Authors Computation

The results above showed the prob. (chi-square) having a value of 0.0660 which is greater than the 5% level of significance, therefore we accepted the null hypothesis which stated that there is no serial correlation

Table 4.4.2Tabular Representation of Hetroscedasticity Result

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.836432	Prob. F(16,23)	0.6379
Obs*R-squared	14.71340	Prob. Chi-Square(16)	0.5457
Scaled explained SS	3.191141	Prob. Chi-Square(16)	0.9997

Source: Authors Computation from E-view 11

Hypothesis

H0: homoskedasticity

H1: heteroskedasticity

At 5% significant level, probability level is 0.6379 which is greater than 0.05. Therefore, null hypothesis is accepted. This means that the variance for the residuals is uniform (homoscedasticity). The full part of the result can be found in appendix

4.4.3 Normality Test

In general, a normality test is used to verify if a data set is well-modelled by a normal distribution or not, or to compute how likely an underlying random variable is to be normally distributed. The essence of this test is to check if the residual of the model is normally distributed. One of the assumptions of least square estimator is that the residuals are normally distributed; obeying well defined probability laws and also can bear any value which could be negative, positive or zero. The full version of the result can be found in appendix

Table 4.2.15 Tabular Representation of Normality Result

	Series: Residuals
	Sample 1983 2022
	Observations 40
Mean	5.70e-12
Median	-80.82563
Maximum	1192.210
Minimum	-971.2067
Std. Dev.	526.5296
Skewness	0.224822
Kurtosis	2.311980
Jarque-Bera	1.125919
Probability	0.569521
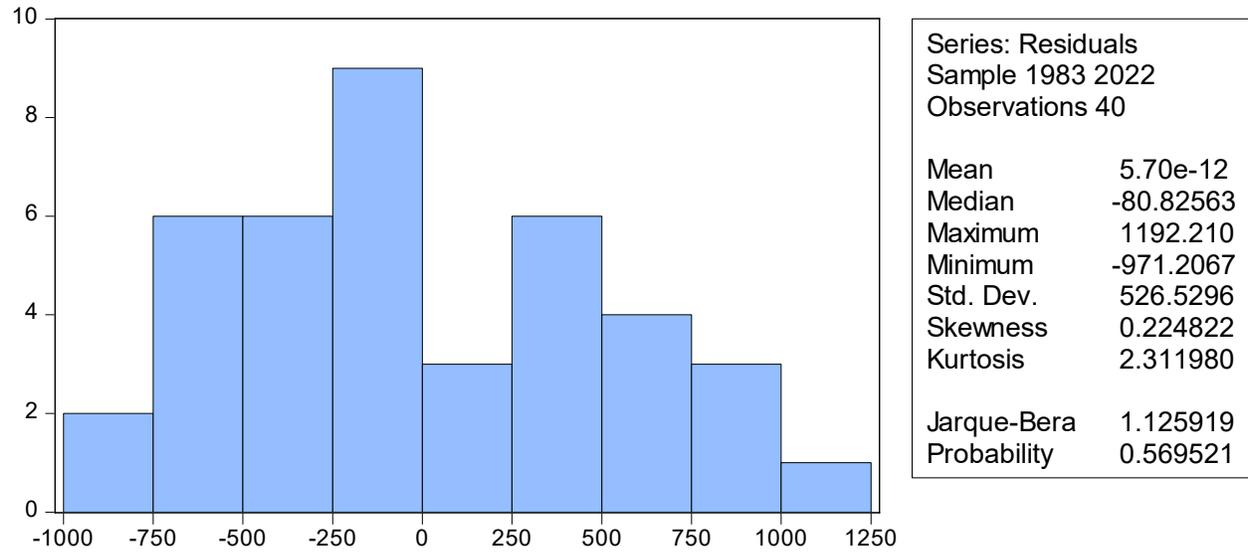
Source: Authors Computation from E-view 8

It can be seen that the reported probability is greater than at 5% significant level and therefore, the null hypothesis is accepted. This means that the residuals are normally distributed.

4.5 Hypothesis Testing

In a bid to carry out the necessary empirical analysis a hypothesis were formulated and have to be tested to verity the validity or otherwise of such proposition.

Hypothesis One

i. H_0: Inflation does not have a significant impact on Nigeria's economic growth.
   H_1: Inflation has a significant impact on Nigeria's economic growth.

From the above regression result, it was observed that t-test on Inflation is statistically insignificant; at first lag -1.590447 (0.1274). The probability result of Inflation which is 0.1274 and greater than 0.05 suggest that the null hypothesis of no significant effect of Inflation on economic growth should be accepted and alternative hypothesis rejected.

Hypothesis Two

i. H_0: There is no threshold effect of inflation on economic growth in Nigeria
   H_1: There is threshold effect of inflation on economic growth in Nigeria.

From the above regression result it was observes that t-test on threshold is statistically significant, with its values as 3.084607 (0.0058). The probability result of threshold which is 0058 and less than 0.5 suggest that the null hypothesis of no significant effect of threshold on economic growth should be rejected and alternative hypothesis accepted this further means that there is threshold effect of inflation on economic growth in Nigeria.

Hypothesis Three

    i. H_0: Inflation targeting does not have a significant effect on Nigeria's economic growth.
            H_1: Inflation targeting does have a significant effect on Nigeria's economic growth.

Meanwhile, drawing inference from table 4.3 above we find out that the computed value of T- test for Inflation targeting is -2.819747 While it's probability is -0.0106 since it's probability is less than 0.05% level of significance, we reject the null hypotheses (H_0) and accept the alternative hypothesis which says that Inflation targeting have a significant negative effect on Nigeria's economic growth.

Conclusion and Recommendations

The study focused on the inflation targeting and economic growth in Nigeria.. High and unstable rates of inflation can negatively impact macroeconomic. The study adopts unit root, bound co-integration and ARDL model on a time series data from 1981 to 2022. The regression result reveals that about 79 % of the systematic variation in the dependent variable is explained by the six independent variables such gross fixed capital formation, human capital index, inflation rate, inflation targeting, money supply and exchange rate. The F-statistic is significant at the 5% level showing that there is a linear relationship between the inflation targeting and economic growth in Nigeria. The result reveals that, Inflation has a significant impact on Nigeria's economic growth. There is threshold effect of inflation on economic growth in Nigeria. Inflation targeting does have a significant effect on Nigeria's economic growth. The researcher concluded that the inflation targeting has significant positive effect on economic growth in Nigeria. Based on the findings the followings are recommended More realistic effort is necessary by the monetary authorities to target inflation strongly by reducing inflation to a single digit as contained in the economic recovery growth plan Inflation threshold need not be necessarily the inflation target, the inflation objective for monetary policy should be set lower than the inflation threshold. Monetary authorities should make a more

practical effort to manage inflation forcefully in order to avert its negative effects by assuring a bearable rate that would boost Nigeria's economic growth

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Data for the Model

	LRDP	LGFCF	HCI	INF	INF2	DD	MS	EXR
1981	9.632859	2.9	0.08	20.81	433.06	0	14.47	0.61
1982	9.614810	2.84	0.09	7.7	59.29	0	15.79	0.67
1983	9.536021	2.59	0.08	23.21	538.7	0	17.69	0.72
1984	9.530920	2.21	0.06	17.82	317.55	0	20.11	0.76
1985	9.612728	2.17	0.07	7.44	55.35	0	22.3	0.89
1986	9.631547	2.43	0.11	5.72	32.72	0	23.81	2.02
1987	9.633248	2.72	0.12	11.29	127.46	0	27.57	4.02
1988	9.693715	2.87	0.1	54.51	2971.34	0	38.36	4.54
1989	9.758154	3.29	0.1	50.47	2547.22	0	45.9	7.39
1990	9.868152	3.69	0.18	7.36	54.17	0	47.42	8.04
1991	9.862617	3.81	0.19	13.01	169.26	0	75.4	9.91
1992	9.884314	4.26	0.18	44.59	1988.27	0	111.11	17.3
1993	9.899881	4.57	0.19	57.17	3268.41	0	165.34	22.05
1994	9.902443	4.66	0.19	57.03	3252.42	0	230.29	21.89
1995	9.920993	4.96	0.23	72.84	5305.67	0	289.09	21.89
1996	9.960714	5.32	0.23	29.27	856.73	0	345.85	21.89
1997	9.989165	5.49	0.19	8.53	72.76	0	413.28	21.89
1998	10.01381	5.49	0.24	10	100	0	488.15	21.89
1999	10.01902	5.45	0.24	6.62	43.82	0	628.95	92.69
2000	10.07274	5.8	0.26	6.93	48.02	0	878.46	102.11
2001	10.13728	5.92	0.24	18.87	356.08	0	1269.32	111.94
2002	10.27359	6.21	0.27	12.88	165.89	0	1505.96	120.97
2003	10.36437	6.76	0.25	14.03	196.84	0	1952.92	129.36
2004	10.46369	6.76	0.25	15	225	0	2131.82	133.5

2005	10.53143	6.69	0.22	17.86	318.98	0	2637.91	132.15
2006	10.59652	7.34	0.21	8.24	67.9	0	3797.91	128.65
2007	10.66715	7.57	0.3	5.38	28.94	1	5127.4	125.83
2008	10.73667	7.63	0.22	11.58	134.1	1	8643.43	118.57
2009	10.81690	8.02	0.23	11.54	133.17	1	9687.51	148.88
2010	10.90801	8.3	0.24	13.72	188.24	1	11101.46	150.3
2011	10.95973	8.27	0.33	10.84	117.51	1	12628.32	153.86
2012	11.00093	8.12	0.29	12.22	149.33	1	15503.41	157.5
2013	11.05436	9.14	0.31	8.48	71.91	1	18743.07	157.31
2014	11.11473	9.27	0.36	8.06	64.96	1	20415.61	158.55
2015	11.14221	9.27	0.4	9.02	81.36	1	20885.52	193.28
2016	11.12625	9.28	0.44	9.06	82.08	1	24259	253.49
2017	11.13446	9.25	0.47	9.33	87.05	1	28604.47	305.79
2018	11.15339	9.41	0.35	9.6	92.16	1	29774.43	306.08
2019	11.17588	9.46	0.33	9.87	97.42	1	34257.9	306.92
2020	11.19132	9.47	0.33	9.87	97.42	1	36038.01	358.81
2021	11.19353	9.48	0.34	9.88	97.61	1	40318.29	355.81
2022	11.20413	9.5	0.35	9.89	9.89	1	404429.3	356.97

ARDL Cointegrating And Long Run Form
Dependent Variable: LRGDP
Selected Model: ARDL(1, 2, 0, 1, 1, 0, 1, 1, 1)
Date: 03/24/24   Time: 01:07
Sample: 1981 2022
Included observations: 40

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LLGFCF)	0.101471	0.108481	0.935377	0.3593
D(LLGFCF(-1))	0.194289	0.090734	2.141305	0.0431
D(HCI)	0.107509	0.127279	0.844676	0.4070
D(INF)	-0.001331	0.000915	-1.455059	0.1592
D(LINF2)	0.010528	0.010362	1.016019	0.3202
D(LDD)	-0.002870	0.032637	-0.087922	0.9307

D(INF * DD)	0.000000	0.000001	0.351540	0.7284
D(LMS)	0.013556	0.015339	0.883775	0.3860
D(EXR)	-0.000337	0.000268	-1.258322	0.2209
CointEq(-1)	-0.129274	0.052432	-2.465553	0.0216

Cointeq = LRGDP - (-1.9664*LLGFCF + 0.8316*HCI - 0.0253*INF + 0.3744

*LINF2 -0.0222*LDD -0.0000*DD*INF + 0.6264*LMS + 0.0021*EXR +

8.1700)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLGFCF	-1.966448	1.233976	-1.593587	0.1247
HCI	0.831642	0.925187	0.898891	0.3780
INF	-0.025335	0.012396	-2.043813	0.0526
LINF2	0.374379	0.175933	2.127959	0.0443
LDD	-0.022197	0.247940	-0.089527	0.9294
DD*INF	-0.000009	0.000006	-1.400091	0.1748
LMS	0.626447	0.152504	4.107731	0.0004
EXR	0.002103	0.001992	1.055786	0.3020
C	8.170039	0.579259	14.104284	0.0000

Dependent Variable: LRGDP
Method: ARDL
Date: 03/24/24 Time: 00:45
Sample (adjusted): 1984 2022
Included observations: 39 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): LLGFCF HCI INF LINF2 LDD DD
    *INF LMS EXR
Fixed regressors: C
Number of models evalulated: 196608
Selected Model: ARDL(1, 3, 1, 1, 1, 0, 1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LRGDP(-1)	0.855874	0.048753	17.55549	0.0000
LLGFCF	0.050085	0.104618	0.478743	0.6373
LLGFCF(-1)	-0.248431	0.130222	-1.907746	0.0709
LLGFCF(-2)	0.084618	0.130713	0.647359	0.5248
LLGFCF(-3)	-0.232713	0.097923	-2.376490	0.0276
HCI	0.169101	0.127277	1.328611	0.1989
HCI(-1)	-0.134400	0.113338	-1.185832	0.2496
INF	-0.001403	0.000882	-1.590447	0.1274
INF(-1)	-0.001320	0.000852	-1.549613	0.1369
LINF2	0.008531	0.010308	0.827681	0.4176
LINF2(-1)	0.030501	0.009888	3.084607	0.0058
LDD	0.014510	0.038915	0.372864	0.7132
DD*INF	1.10E-08	5.72E-07	0.019243	0.9848
DD(-1)*INF(-1)	-1.32E-06	4.68E-07	-2.819747	0.0106
LMS	0.007068	0.014567	0.485216	0.6328
LMS(-1)	0.079860	0.025794	3.096079	0.0057
EXR	-0.000362	0.000245	-1.474917	0.1558
EXR(-1)	0.000740	0.000249	2.974990	0.0075
C	1.256318	0.450127	2.791029	0.0113

R-squared	0.999390	Mean dependent var	10.41540
Adjusted R-squared	0.998842	S.D. dependent var	0.581491
S.E. of regression	0.019790	Akaike info-criterion	4.700762
Sum squared resid	0.007833	Schwarz criterion	-3.890308
Log likelihood	110.6649	Hannan-Quinn criter.	-4.409978
F-statistic	1821.570	Durbin-Watson stat	2.574271
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model
   selection.

	Series: Residuals
	Sample 1983 2022
	Observations 40
Mean	5.70e-12
Median	-80.82563
Maximum	1192.210
Minimum	-971.2067
Std. Dev.	526.5296
Skewness	0.224822
Kurtosis	2.311980
Jarque-Bera	1.125919
Probability	0.569521