

Classical or Keynesian? Testing the Asymmetric Relationship between Inflation and Economic Growth in South Africa

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Received: August 9, 2023 ▪ Reviewed: September 8, 2023

▪ Accepted: October 28, 2023 ▪ Published: November 30, 2023

Abstract:

The correlation and cointegration between economic growth and inflation is one of the most discussed topics within various economic schools. While classical economists acknowledge an inverse relationship between inflation and economic growth, Keynesian economists posit that a positive relationship exists between these two economic variables. To ascertain which economic theory prevails in the South African economy, the current study applies a Nonlinear Autoregressive Distributed Lag (NARDL) model on quarterly data sets between 2008 and 2022. The estimated results suggest the presence of a negative asymmetric long-run relationship between inflation and economic growth. Consequently, the empirical findings support the classical hypothesis dominance, suggesting a negative effect of inflation on economic growth. Based on these results, price stability should be considered a core requirement in ascertaining long-term economic growth in South Africa. Additionally, instead of enduring high-level inflation as hypothesized by Keynesian theory, the enhancement of long-run economic growth in South Africa necessitates anti-inflationary policies.

Keywords: economic growth, inflation, nonlinear autoregressive distributed lag, South Africa.

古典主义还是凯恩斯主义？检验南非通货膨胀与经济增长之间的不对称关系

摘要：

经济增长与通货膨胀之间的相关性和协整性是各经济学派讨论最多的话题之一。虽然古典经济学家承认通货膨胀与经济增长之间存在负相关关系，但凯恩斯主义经济学家认为这两个经济变量之间存在正相关关系。为了确定哪种经济理论在南非经济中占主导地位，当前的研究对 2008 年至 2022 年的季度数据集应用了非线性自回归分布滞后 (全国 ARDL) 模型。估计结果表明，通货膨胀之间存在负的不对称长期关系 和经济增长

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长。因此,实证结果支持了经典假设的主导地位,表明通货膨胀对经济增长产生负面影响。基于这些结果,价格稳定应被视为确定南非长期经济增长的核心要求。此外,南非若要增强长期经济增长,就必须采取反通胀政策,而不是像凯恩斯理论所假设的那样承受高水平通胀。

关键词: 经济增长、通货膨胀、非线性自回归分布滞后、南非。

1. Introduction

A country's economic functioning system and its well-being are contingent on the stability or steadiness of macroeconomic variables (Karahan & Çolak, 2020). Any shock that may cause instability of macroeconomic variables leads to a disturbance in the country's economic structure and functions. Although the economic field possesses several schools of thought, each school admits the role of macroeconomic variables stability for the sustainability and balance of any economy. For instance, the Classical school of thought considers price stability as the foundation of a sustainable and strong economic structure; while the Keynesian school of thought considers the stability and optimum aggregated demand as the foundation of stable and sound economic growth (Keynes, 1936).

The existing literature indicates that economists who support the classical hypothesis emphasize the negative effect of inflation on economic systems. They argue that a high inflation rate generates uncertainties for the fundamental actors of economic life, namely producers and consumers. In other words, in the view of classical economists, price insanity is caused by inflation, and as a result, major economic activities cannot be properly performed in an inflationary environment (Karahan, & Çolak, 2020). In other words, essential economic activities and sustainable economic growth can only be achieved in an environment of stable prices.

On the other hand, the Keynesian school of thought emphasizes economic factors associated with the shortage of aggregate demand resulting from structural issues of the capitalist economy. Subsequently, the Keynesian approach argues that policymakers have a significant role in initiating public policies that upsurge aggregate demand which is the engine of economic growth. The Keynesian approach further highlights the criticality of aggregated demand promotion as a source of economic growth, irrespective of whether the high volume of demand can cause price instability or not. The advocates of Keynesian theory ignore the fact that boosting economic thought demand volume growth, according to low demand, may also lead to high prices, which is the source of inflation.

Briefly, regarding the relationship between economic growth and inflation, Keynesian theory opts for a positive relationship between inflation and economic growth, whereas Classical theory opts for an inverse relationship between the two economic variables. Although researchers and scholars have tried to investigate the validity of the two schools of thought (Classical and Keynesian) concerning economic growth and inflation over the years, controversy remains in the

literature and each view might hold depending on an individual country's economy. Additionally, given the economic fluctuations that the South African economy is experiencing and the escalating rate of inflation, it is important to assess which economic theory, between Classical and Keynesian, is dominant in South African economic growth. The knowledge of the dominant theory in South Africa can serve as a guideline in proposing adequate policies for economic growth and development.

The remaining sections of the study are subdivided as follows: section two presents and discusses brief literature on the linkage between economic growth and inflation. Section three discusses the data and methodology employed to achieve the study objective. Section four displays and discusses the estimated empirical results, while section four provides a concise conclusion followed by policy implications, study limitations and suggestions for future studies.

2. Literature Review

Examining the cointegration between economic growth and inflation has been a serious challenge for various economists over the years. Consequently, the literature provides a large number of studies conducted to determine the relationship between inflation and economic growth as many countries in different periods have introduced and implemented programs for inflation-targeted stabilization (Karahan, & Çolak, 2020). Despite the vast empirical finding on the relationship between the two variables, debates and discussion continue due to the necessity and needs for answers to the current situation of economies. Additionally, the two important economic theories namely Classical and Keynesian are still relevant yet opposing their views on the relationship between economic growth and inflation. The Classical theory argues that an inverse relationship exists between inflation and economic growth. In other words, the fundamental and popular argument of this theory states that a growing rate of inflation causes uncertainty in the economy and results in a decline in economic growth. The cause decline in the later variables is that inflation fluctuations cause price instabilities and the latter cause changes in consumption and investment levels (Asab & Al-Tarawneh, 2018; Fischer, 2013).

Various studies conducted in testing the reliability of the Classical assumption of an inverse relationship between economic growth and inflation. Ma (1998) in Colombia applied the vector autoregression (VAR) model to time series data to analyze the relationship between inflation and economic growth. The study

findings confirmed the classical hypothesis, as the regression results indicated that a rise in inflation caused a decline in the Colombian economy over the analysed period. The same relationship was tested by Fountas et al. (2002) in Japan. Using the bivariate generalized autoregressive conditional heteroscedasticity (GARCH) model, the finding of the study revealed that a high inflation rate led to a decline in both production output and economic growth in Japan. Additionally, using panel data analysis, Bittencourt (2012) analyzed the effect of inflation on economic growth in different countries of Latin America. His findings indicated that a high inflation rate has unfavorable repercussions on economic growth. Other recent studies such as Bittencourt (2010), Kasidi and Mwakanemela (2015), Al-Taeshi (2016), Denbel et al. (2016), and Idris and Suleiman (2019) were also conducted in different economies and have confirmed the classical assumption that high inflation leads to low economic growth.

In contrast to the Classical theory, the Keynesian theory asserts inflation and economic growth are positively related. The theory argues that high aggregate demand remains the core factor of economic growth. In the process of growing the economy through a demand mechanism, there is a possibility of having access demand which may cause a price increase. Consequently, instead of being a problem, inflation is a natural phenomenon of promoting economic growth (Karahan & Çolak, 2020). This argument for the

promotion of economic growth through inflation channels is supported by various economists (Jayathilake & Rathnayake, 2013). These economists argue that the owing top high inflation price rises and if aggregate demand also increases, producers will only feel the high price of their product and they increase their production, which in return, will also increase economic output. Additionally, high inflation pushes economic actors to substitute their money into real investment resulting in capital intensive and enhancement of economic growth (Gokal & Hanif, 2004). In short, the aforementioned advocates of the Keynesian theory affirm that it is more likely to promote economic growth through and within the inflationary environment. This argument was also empirically supported by the recent findings of Chude and Chude (2015), Enejoh and Tsauni (2017) and Anidiobu et al. (2018). Based on the dichotomy between Keynesian and Classical hypotheses of the linkage between inflation and economic growth, one can conclude that the direction of the relationship between the two economic variables is not obvious and depends on each country's policies.

3. Data Description and Model Specification

The research methodology, approaches and analysis followed the flowchart presented in Figure 1:

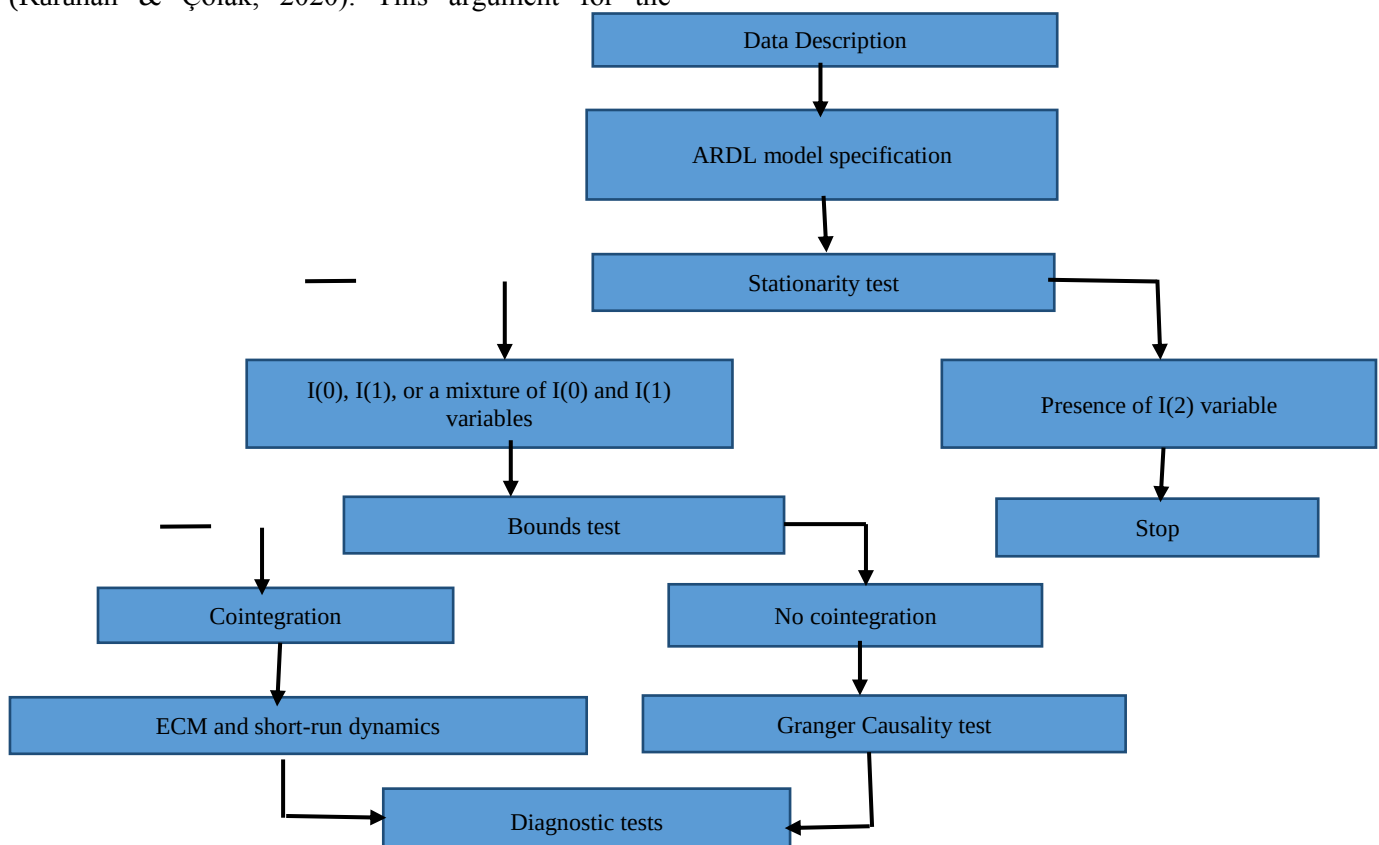


Figure 1. Research flowchart (The authors' compilation)

3.1. Data Description

To assess the effect of inflation on economic growth, quarterly data from 1995 to 2002 were used. The

sample period has selected the fact that the researcher intended to analyze the economic performance of the country during the democracy after the abolition of

economic sanctions against the apartheid regime. Second, the availability of data determined the closing date. The series analyzed are gross domestic product (GDP) in terms of growth rate and inflation (INF). In other words, this analysis focuses on the South African economic growth rate (GR) nexus inflation growth rate. The Consumer Price Index (CPI) was used as a proxy for the inflation rate, while the percentage of real GDP was employed as a proxy for economic growth. The series data employed in this study was obtained from the South African Reserve Bank. Prior to the long-run relationship analysis, it is important to provide a descriptive view of the data set features. Thus, descriptive statistics of the dataset are presented in Table 1. While the difference between minimum and maximum for inflation is small, the difference between maximum and minimum for economic growth is relatively high. This is justified by their standard deviation. A high standard deviation for economic growth indicates that this variable experienced high volatilities over the analyzed period. On the other hand, the standard deviation for inflation is very low. Nonetheless, both variables are negatively skewed.

Table 1. Summary statistics (The authors' compilation)

	GR	LINF
Mean	2.062348	4.141135
Maximum	16.46094	4.673763
Minimum	-17.06998	3.625744
Std. Dev.	2.860429	0.314133
Skewness	-2.063704	-0.008049
Kurtosis	32.34229	1.657370
Observations	84	84

3.2. Model Specification

Various studies that analyzed the relationship between economic growth and inflation in South Africa mostly used Granger causality, error correction modeling and cointegration approaches. Additionally, the majority of those studies assumed that the relationship between the two variables was symmetric or linear. Thus, they failed to present asymmetric long run and short run between the two variables. To overcome those shortcomings, the current study adopts an alternative econometric approach which is the nonlinear ARDL model. The NARDL model is an extension of the ARDL model introduced by Pesaran and Shin (1999) and improved by Pesaran et al. (2001). The NARDL model is adequate to assess the asymmetric or nonlinear relationship between variables. Thus, it was adopted to analyze the asymmetric relationship between inflation and economic growth in South Africa. The generalized form of the study model is expressed as follows:

$$GR_t = \alpha_t + \beta_0 INF + e_t \quad (1)$$

where GR denotes the growth rate of GDP and is used as a response/dependent variable and INF represents the inflation rate used as an explanatory variable. Given that this study aims to assess the symmetric relationship between economic growth and inflation, the subsequent equation was estimated for the long-run relationship.

$$GR_t = \alpha_0 + \beta_1 INF_t^+ + \beta_2 INF_t^- + e_t \quad (2)$$

where both INF_t^+ and INF_t^- represent a partial sum of positive and negative shocks in the inflation rate, respectively. While β_1 and β_2 represent the estimated vector of long-run parameters. In Equation 2, the INF^+ indicates positive long-term changes in the inflation rate, consequently, β_1 represents the long-run effect of inflation growth on economic growth. On the other hand, INF^- represents indicates negative long-term changes in the inflation rate and β_2 denotes the long-run effect of inflation decline on economic growth. Equations 3 and 4 below display the method used in calculating both INF_t^+ and INF_t^- :

$$INF_t^+ = \sum_{i=1}^t \Delta INF_t^+ = \sum_{i=1}^t \max(\Delta INF_i, 0) \quad (3)$$

$$INF_t^- = \sum_{i=1}^t \Delta INF_t^- = \sum_{i=1}^t \min(\Delta INF_i, 0) \quad (4)$$

It is important to highlight that Equation 2 represents a static model of asymmetric regression suggesting a nonlinear relationship between the series under consideration. Nonetheless, the presence of nonlinear relationships between variables displays also dynamic characters. This type of relationship is estimated using unrestricted NARDL. From Equation 2, the subsequent unrestricted NARDL was constructed.

$$GR_t = \gamma + \delta_0 GR_{t-1} + \delta_1 INF_{t-1}^+ + \delta_2 INF_{t-1}^- + \sum_{i=1}^p \phi \Delta GR_{t-1} + \sum_{i=1}^q \lambda_{t-1}^+ \Delta INF_{t-1}^+ + \lambda_{t-1}^- \Delta INF_{t-1}^- + u_t \quad (5)$$

From Equation 5, the coefficients of the long-run relationship presented in Equation 2 can now be defined as follows: $\beta_1 = -\delta_1/\delta_0$ and $-\beta_2 = \delta_2/\delta_0$. Additionally, Equation 5 presents the possibility of calculating the short-run dynamics of the relationship between inflation and economic growth. This can be achieved using $\sum_{i=1}^q \lambda_{t-1}^+$ as a measure of the short-run effect of the positive growth of inflation on economic growth and $\sum_{i=1}^q \lambda_{t-1}^-$ as a measure of the short-run effect of the decline in inflation on economic growth. Furthermore, the estimation of Equation 5 (unrestricted NARDL) allows simultaneous tests namely asymmetric cointegration and short-run dynamics amongst variables. The following hypotheses were formulated to determine the existence of a nonlinear long-run relationship between inflation and economic growth:

$H_0 = \delta_0 = \delta_1 = \delta_2 = 0$ for no asymmetric cointegration and $H_A \neq \delta_0 \neq \delta_1 \neq \delta_2 \neq 0$ as an alternative. The null hypothesis (H_0) was assessed using the Wald F-test. The standard Wald test was also applied to the null hypothesis of the short-run relationship $\sum_{i=1}^n \lambda_{t-1}^+ = \sum_{i=1}^n \lambda_{t-1}^-$. The rejection of the null hypotheses implies that the effect of inflation on economic growth in South Africa is not linear but rather asymmetric.

3.2.1. The NARDL Model

Both positive and negative changes in inflation affect economic growth. However, their implications on the economy are not identical. Researchers mostly consider the symmetric relationship between economic variables, yet in reality, the asymmetric relationship is dominant not only among economic variables but in all social sciences (Shin & Greenwood-Nimmo, 2014). Estimating a linear relationship in which the real relationship is nonlinear or asymmetric will lead to inaccurate results and inadequate economic policies (Enders, 2008). Given that traditional cointegration approaches do not allow capturing the nonlinearity or asymmetries within economic variables, the Non-linear Autoregressive Lagged (NARDL) model becomes a good alternative for the current study.

4. Empirical Results

4.1. Unit Root Test

To avoid spurious results, the first step in the econometric analysis should be the determination of the variables' integration order or test for stationarity. The ADF unit root test was performed to avoid the use of the variable that is I(2). As indicated in Table 2, the study series is a combination of I(1) and I(0). In other words, while the series of GR is integrated at level, the series of INF become stationary after the first difference. Since all variables are integrated into orders that are below the second difference I(2), the NARDL is the appropriate model to estimate both long-run and short-run among variables. The researcher allowed the system to select the lag length automatically using the SIC criteria.

Table 2. ADF unit root results (The authors' compilation)

Variables	ADF test (at levels)	ADF test (trend)	Decision
GR	-12.29410 (0.0001)*	-9.182612 (0.000)*	I(0)
INF	4.647771 (1.0000)	-0.425585 (0.9851)	I(1)
GR	-8.569648 (0.000)*	-8.506657 (0.000)*	I(1)
INF	-5.384197 (0.000)*	-6.601491 (0.000)*	I(1)

* Significance level at 0.01

4.2. Bound Tests for Linear Cointegration

Prior to the estimation of the nonlinear relationship, we first assessed whether a linear relationship exists between inflation and economic growth in the South African economy. The test was performed through the ARDL model. Results in Table 3 indicate that the value of the calculated F-statistic exceeds the upper bounds critical values at a one percent significance level, and this allows the rejection of the null hypothesis. Given that the study aims to provide a nonlinear relationship between the underpinned variables, other results of the linear analysis, such as long-run and short-run coefficients, are not reported in the study but are available if requested from the authors. This implies the existence of a linear long-run relationship exist between inflation and economic growth in South Africa.

Table 3. Bound test for a linear relationship between inflation and

economic growth (The authors' compilation)

Test Statistic	Value
F-statistic	35.56684
Critical Value Bounds	
Significance	I(0) Bound I(1) Bound
10%	4.04 4.78
5%	4.94 5.73
2.5%	5.77 6.68
1%	6.84 7.84

4.3. Bound Tests for Nonlinear Cointegration

The main objective of this study is to assess the asymmetric relationship between inflation and economic growth and thereafter conclude which economic theory, between Keynesian and Classical, dominates the South African economy. Prior to estimation, it is important to recall that two or more variables cointegrate if a long-term relationship exists between them (Gupjarati, 2004). In the current study, the existence of that relationship was tested using bounds tests for cointegration. From Table 4, it is evident that the null hypothesis of no asymmetric cointegration must be rejected because the calculated F-statistic (20.03343) is higher than all the upper bound critical values at a 1% level of significance. This implies that the asymmetric relationship between inflation and economic growth can be confirmed with a 99 confidence level.

Table 4. NARL bound tests (The authors' compilation)

F-statistic	20.03343	
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

4.4. Long-Term Coefficients of NARDL

Since a long-run asymmetric relationship exists between economic growth and inflation. It is important to determine to which extent positive or negative changes in inflation affect South African economic growth. From the results in Table 4, it can be concluded that positive changes in the inflation rate result in negative changes in economic growth. As such, a 10 percent increase in inflation causes economic growth to decline by 0.3 percent. Contrary to the positive changes, negative changes in the inflation rate are not statistically significant to influence changes in economic growth.

Table 5. Long-run coefficients (The authors' compilation)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF ⁺	-0.030305	0.008647	-3.504662	0.0008
INF ⁻	-0.025436	0.764258	-0.033282	0.9735
C	2.517098	0.834167	3.017500	0.0036

4.5. Error Correction Model and Short-Run Dynamics

To ensure the stability of the model and the convergence of short-run deviations toward long-run equilibrium, researchers estimated the error correction model. Results in Table 6 confirm the validity and the solidity of the error correction term as it is statistically

significant at a 1 percent level and its value (-0.376880) sign is negative. This implies that approximately 38 percent of short-term shocks that occur in the model are rectified each quarter and the model requires 2.65 (1/-0.376880) quarters to return to its long-run equilibrium. On the other hand, the short-term results confirm the long-run run results. Short-run positive shocks, from current down to 3 quarters, are statistically significant to cause changes in economic growth. However, similar to long-run coefficients in Table 5, shot-run negative changes/shocks in the inflation level have no significant power to impact economic growth as indicated by the probability value of 0.9736 which is far away from 0.05 critical value.

Table 6. Error correction model and short-run dynamics (The authors' compilation)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	1.053696	0.255919	4.117304	0.0001
D(GR(-2))	0.495575	0.183323	2.703287	0.0087
D(GR(-3))	0.316160	0.103315	3.060168	0.0032
D(INF ⁺)	3.096203	0.635217	4.874244	0.0000
D(INF ⁺ (-1))	-4.100573	1.331862	-3.078827	0.0030
D(INF ⁺ (-2))	4.384923	1.341627	3.268362	0.0017
D(INF ⁺ (-3))	-2.226627	0.788639	-2.823379	0.0062
D(INF ⁻)	-0.060458	1.816839	-0.033276	0.9736

Table 7. Residual diagnostic tests (The authors' compilation)

Tests	Value or P- value	Decision
R-squared	0.799522	Almost 80 % of the shocks in the response variable are explained by the explanatory variable.
Heteroscedasticity	0.5535	Series are homoscedastic
Serial Correlation LM	0.1650	Variables are not serially correlated.
Durbin-Watson	2.127148	Variables are not serially correlated.
CUSUM and CUSUMQ	The model is stable at the 5% level of significance	

5. Discussion

Finding from both long-run and short-run estimations indicated an inverse relationship between inflation and economic growth in South Africa. These results are in line with those of Bittencourt (2010), Kasidi and Mwakanemela (2015), Al-Taeshi (2016), Denbel et al. (2016) , and Idris and Suleiman (2019), whose findings revealed an adverse relationship between inflation and economic growth. The current study's findings, similar to those aforementioned, suggest that growing levels of inflation impede economic growth. Investment is one of the key factors of economic growth, however owing to a high level of inflation that reduces the purchasing power of money and thereafter reduces demand for goods and services, inflation becomes a bottleneck for investment. Consequently, the economy cannot grow concurrently with inflation. Nonetheless, this study's' findings negate those of Chude and Chude (2015), Enejoh and Tsauni (2017), and Anidiobu et al. (2018), suggesting a positive relationship between economic growth and inflation.

In response to the study question asking the dominant economic theory between Keynesian and Classical or if both theories hold in the South African economy, the answer is that the classical theory

CointEq(-1) -0.376880 0.310977 -7.643268 0.0000

4.6. Model Diagnostic Tests

The validity of the econometric analysis depends on the quality of the model employed. Therefore, to ensure the accuracy of the diagnostic results, stability tests were performed. Table 6 exhibits the values of R-squared and Durban-Watson tests together with the probability values of heteroscedasticity, serial correlation, CUSUM, and CUSUMQ tests. The value of R-squared (0.799522) suggests that *ceteris paribus*, approximately 80 percent of change in the level of economic growth is explained by inflation. The diagnostic tests also suggest that variables are homoscedastic and free of serial correlation, as the null hypotheses of both tests are rejected at a 5% significance level. The results from CUSUM stability tests confirm that the model parameters are stable as both CUSUM and CUSUMQ graphs remain with the boundaries at 5% significant revel for the period of the estimated sample. Briefly, the results in Table 7 confirm the trustworthiness of the study findings as the model did not violate econometric assumptions.

dominates as its hypothesis of an inverse relationship between economic growth and inflation was confirmed by the study findings. Growing inflation in South Africa causes economic uncertainties in both the short and long run. In response to rising inflation, the country's economy experiences low consumption, low production and low investment leading to declining economic growth. Price stability is mandatory in South Africa if the country intends to improve its current economic growth. In other words, policymakers are required to monitor inflation movements to avoid impediments to economic growth.

6. Conclusion

The nature of the connection between economic growth and inflation remains one of the most debatable issues among economic researchers and scholars. Most arguments are caused by a dichotomy between the two well-known economic theories namely Classical and Keynesian. While the former hypothesises an inverse relationship between inflation and economic growth, the latter considers inflation as a natural phenomenon where the economy is growing. Consequently, irrespective of the number of studies conducted on the linkage between inflation and economic growth, there is no unanimity or consensus on the direction (sign) of

causation between the two variables. Given that there is the possibility of linear and nonlinear relationships between inflation and economic growth, the current study both linear and nonlinear relationships of the two variables in South Africa. To achieve this objective, the researchers applied ARDL and NARDL on time series for the period from 2008 to 2022. The estimated results confirmed the presence of a negative nonlinear relationship between inflation and economic growth for both the short-run and long-run. However, negative coefficients of inflation were found to be statistically insignificant to impact on economic growth in both the long-run and short-run. This implies that growing inflation (high price) reduces consumption, production and investment which in turn creates uncertainties in economic prospects. Consequently, high inflation is the cause and source of low economic activities and economic growth in South Africa.

Given that inflation in South Africa is not a natural phenomenon, as hypothesized by Keynesian theory, which the country would undergo for economic improvement, the South African economy requires anti-inflationary policies. Consequently, some monetary policies such as the high interest rate implemented in 2023 are justifiable as inflation is a serious issue for South African economic growth. Although Keynesian and classical theory plays an important role in economy, the limitation of the study is to consider inflation as a sole economic variable that impact the level of GDP and output whilst inflation is not the only variables that determines economic growth behaviour. Consequently, future studies should extend the scope of the study by including other economic variables such as technology improvement, capital accessibility, natural resources, and human capital development.

References

- [1] AL-TAESHI, H. T. A. (2016). The impact of inflation on economic growth: evidence of Malaysia from the period 1970-2014 (Published Master Thesis Submitted to Near East University Graduate School of Social Sciences Economics Master's Programme). Retrieved from <http://docs.neu.edu.tr/library/6429447589.pdf>.
- [2] ANIDIOLU, G. A., OKOLIE, P. I. P., & OLEKA, D. C. (2018). Analysis of inflation and its effect on economic growth in Nigeria. *Journal of Economics and Finance*, 9(1), 28-36. Retrieved from <https://pdfs.semanticscholar.org/c3ff/4456345e5a0a17efb5c3da40e0aad8bf38e.pdf>.
- [3] ASAB, N. A., & AL-TARAWNEH, A. (2018). The impact of inflation on the investment: The non-linear nexus and inflation threshold in Jordan. *Modern Applied Science*, 12(12), pp. 1913-1844.
- [4] BITTENCOURT, M. (2012). Inflation and economic growth in Latin America: Some panel time-series evidence. *Economic Modelling*, 29, pp. 333-340.
- [5] CHUDE, D. I., & CHUDE, N. P. (2015). Impact of inflation on economic growth in Nigeria. *International Journal of Business and Management Review*, 3(5), pp. 26-34.
- [6] ENDERS, W. (2008). *Applied econometric time series*, 3rd edn. Wiley.
- [7] ENEJOH, S. Y., & TSAUNI, A. M. (2017). An analytical study of the impact of inflation on economic growth in Nigeria (1970–2016). *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 7(4), pp. 110-120. <http://doi.org/10.6007/IJARAFMS/v7-i4/3438>.
- [8] FISCHER, G. (2013). Investment choice and inflation uncertainty, working paper, The London School of Economics and Political Science.
- [9] FOUNTAS, S., KARANASOS, M., & KIM, J. (2002). Inflation and output growth uncertainty in their relationship with inflation and output growth. *Economic Letter*, 75, pp. 293–301.
- [10] GOKAL, V., & HANIF, S. (2004). *Relationship between inflation and growth*. Economic Department Working Paper/Reserve Bank of Fiji, 2004-04.
- [11] JAYATHILAKE, P. M. B., & RATHNAYAKE, R. M. K. T. (2013). Testing the link between inflation and economic growth: Evidence from Asia. *Modern Economy*, 4, pp. 87-92. <http://dx.doi.org/10.4236/me.2013.42011>.
- [12] KARAHAN, Ö., & ÇOLAK, O. (2020). Inflation and economic growth in Turkey: evidence from a nonlinear ARDL approach. In *Economic and Financial Challenges for Balkan and Eastern European Countries: Proceedings of the 10th International Conference on the Economies of the Balkan and Eastern European Countries in the Changing World (EBEEC) in Warsaw, Poland 2018* (pp. 33-45). Springer International Publishing.
- [13] KASIDI, F., & MWAKANEMELA, K. (2015). Impact of inflation on economic growth: A case study of Tanzania. *Asian Journal of Empirical Research*, 3(4), pp. 363-380. Retrieved from <http://www.aessweb.com/pdf-files/363-380.pdf>.
- [14] MA, H. (1998). Inflation, uncertainty and growth in Colombia. IMF working paper, WP/98/161.
- [15] BITTENCOURT, M. (2010). Inflation and economic growth in Latin America; some panel time series evidence. *Economic Modelling*, 29(2), pp. 333-340. <https://doi.org/10.1016/j.econmod.2011.10.018>
- [16] PESARAN, M. H., & SHIN, Y. (1999). An autoregressive distributed lag modelling approach to cointegration analysis. In STROM, S. (Ed.) *Econometrics and economic theory in the 20th century* (pp. 371–413). London: Cambridge University Press.
- [17] PESARAN, M. H., SHIN, Y., & SMITH, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16, pp. 289-326.
- [18] SHIN, Y., YU, B., & GREENWOOD-NIMMO,

M. (2014). Modelling Asymmetric Cointegration and Dynamic Multipliers in a Nonlinear ARDL Framework. *Festschrift in Honor of Peter Schmidt*, pp. 281–314. https://doi.org/10.1007/978-1-4899-8008-3_9.

参考文献:

- [1] AL-TAISHI, H.T.A. (2016). 通货膨胀对经济增长的影响：1970-2014 年马来西亚的证据（提交给近东大学社会科学研究生院经济学硕士课程的硕士论文）。检索自 <http://docs.neu.edu.tr/library/6429447589.pdf>。
- [2] ANIDIOBU, G. A., OKOLIE, P. I. P. 和 OLEKA, D. C. (2018). 尼日利亚通货膨胀及其对经济增长的影响分析。《经济与金融杂志》，9(1), 28-36。摘自 <https://pdfs.semanticscholar.org/c3ff/4456345e5a0a17efb5c3da40e0aad8bf38e.pdf>。
- [3] ASAB, N. A. 和 AL-TARAWNEH, A. (2018). 通货膨胀对投资的影响：约旦的非线性关系和通货膨胀阈值。现代应用科学，12(12)，第 1913-1844 页。
- [4] BITTENCOURT, M. (2012)。拉丁美洲的通货膨胀和经济增长：一些面板时间序列证据。经济模型，29，第 333-340 页。
- [5] CHUDE, D. I., 和 CHUDE, N. P. (2015)。通货膨胀对尼日利亚经济增长的影响。《国际商业与管理评论杂志》，3(5)，第 26-34 页。
- [6] ENDERS, W. (2008)。应用计量经济学时间序列，第三版。威利。
- [7] ENEJOH, S. Y. 和 TSAUNI, A. M. (2017)。通货膨胀对尼日利亚经济增长影响的分析研究（1970-2016）。《国际会计、金融和管理科学学术研究杂志》，7(4)，第 110-120 页。<http://doi.org/10.6007/IJARAFMS/v7-i4/3438>。
- [8] FISCHER, G. (2013)。投资选择和通胀不确定性，工作论文，伦敦政治经济学院。
- [9] FOUNTAS, S., KARANASOS, M. 和 KIM, J. (2002)。通货膨胀和产出增长的不确定性与通货膨胀和产出增长的关系。经济通讯，75，第 293-301 页。
- [10] GOKAL, V., 和 HANIF, S. (2004)。通货膨胀与增长之间的关系。经济部工作文件/斐济储备银行，2004-04。
- [11] JAYATHILAKE, P. M. B. 和 RATHNAYAKE, R. M. K. T. (2013)。检验通货膨胀与经济增长之间的联系：来自亚洲的证据。现代经济，4，第 87-92 页。<http://dx.doi.org/10.4236/me.2013.42011>。
- [12] KARAHAN, Ö. 和 ÇOLAK, O. (2020)。土耳其的通货膨胀和经济增长：来自非线性 ARDL 方法的证据。巴尔干和东欧国家面临的经济和金融挑战：2018 年在波兰华沙举行的第十届变化世界中的巴尔干和东欧国家经济国际会议(EBEEC)会议记录（第 33-45 页）。施普林格国际出版社。
- [13] KASIDI, F., 和 MWAKANEMELA, K. (2015)。通货膨胀对经济增长的影响：坦桑尼亚的案例研究。《亚洲实证研究杂志》，3(4)，第 363-380 页。取自 <http://www.aessweb.com/pdf-files/363-380.pdf>。
- [14] MA, H. (1998)。哥伦比亚的通货膨胀、不确定性和增长。基金组织工作文件，湿性粉剂/98/161。
- [15] BITTENCOURT, M. (2010)。拉丁美洲的通货膨胀和经济增长：一些面板时间序列证据。经济模型，29(2)，第 333-340 页。<https://doi.org/10.1016/j.econmod.2011.10.018>
- [16] PESARAN, M. H., 和 SHIN, Y. (1999)。用于协整分析的自回归分布式滞后建模方法。载于 STROM, S. (主编) 20 世纪的计量经济学和经济理论（第 371-413 页）。伦敦：剑桥大学出版社。
- [17] PESARAN, M. H., SHIN, Y., 和 SMITH, R. J. (2001)。用于分析级别关系的边界测试方法。应用计量经济学杂志，16，第 289-326 页。
- [18] SHIN, Y., YU, B., 和 GREENWOOD-NIMMO, M. (2014)。在非线性 ARDL 框架中建模非对称协整和动态乘数。纪念彼得·施密特的节日文集，第 281-314 页。https://doi.org/10.1007/978-1-4899-8008-3_9。