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The Relationship Between Economic Growth and Inflation Rate Flactuations: Evidence from Zambia

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Abstract

The study of the relationship between economic growth rate and the inflation rate has gained popularity among scholars and most of these studies have revealed inconclusive results. Some studies have found no relationship between the two variables while others have found negative and positive relationship. This study will contribute to the existing literature by employing data extracted from IMF statistics for the period from 1995 to 2017 a period of 22 years. In order to analyse the data, Johanson Co-integration analysis was used to establish the long run relationship while the Error Correction Model was used to establish the short run relationship. The co-integration analysis results indicate the existence of long run relationship between economic growth rate and the inflation rate. However the Error Correction Model showed that there is no significant short run relationship. At a practical level, the study provides an insight to policy makers for setting the inflation rate target and expansionary monetary policy aimed at enhancing economic growth.

Keywords

Economic Growth, Inflation Rate, Domestic Purchasing Power, Price Stability, Co-integration

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1. Introduction

Since 1950s, a number of studies have been conducted by scholars from different parts of the world to establish the relationship between inflation rate and economic growth rate (Mallik & Chowdhury, 2001). These studies have produced mixed results. Inflation has significant influence on economic performance through the monetary policy put in place in an economy (Adrián Risso & Sánchez Carrera, 2009). The earlier study by Fischer (1993) using both cross sectional and panel data revealed a negative relationship between economic growth and inflation. Contrary to the findings of these studies, Phillips (1998) employing panel regression found an inverse relationship between economic growth and inflation. Furthermore, Grier and Grier (2006) suggested that there is little or no relationship between economic growth rate and inflation rate. This debate is engineered by two schools of thoughts being the structuralist's and monetarists. Structuralist's suggests that inflation is a vital ingredient for economic growth while monetarists urged that it hinders economic growth (Mallik & Chowdhury, 2001). These studies have been done in the context of developing economies which are characterised by low economic growth rate and high inflation rates (Adrian Risso & Sanchez Carrera, 2009) and include the hyperinflation period of 1980s which most of the Latin American countries experienced (Makuria, 2013). Despite these inconclusive results, there is a shortage of studies in Zambia that have revealed the exact relationship between economic growth and inflation. A recent study done in Zambia by Chibwe (2014) using the data from 1980 to 2011 suggested that inflation hinders economic growth. The study revealed that there is no stable long run equilibrium relationship between economic growth and inflation. Zambia as a country is facing a lot pressure to reduce the inflation rate as a way of enhancing economic activities. The country's inflation rate for

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February 2018 was recorded at 6.1% below the 2018 year-end target of 8%. The annual growth rate in Zambia is averaged 2.95% (www.boz.zm). Therefore, this study investigated the relationship between economic growth and inflation. The study focused on the current data from 1995 to 2017 when the country has gone through main economic reforms among them is changing from a state run economy to the market economy.

The rest of the paper is structured as follows: section 2 presents the literature review; section 3 presents the data; section 4 explains the methodology; section 5 presents the discussion of the findings and section 6 summarises the study with the conclusion.

2. Literature Review

In the recent past studies of the relationship between economic growth and inflation have gained popularity among scholars. A number of studies have been done and produced inconclusive results.

A study conducted by Mallik & Chowdhury (2001) suggested a positive relationship between economic growth and inflation rate. The study used the data from IMF international statistics for the period from 1966 to 1997. The periods used for different countries was different between with the stated period 1966 to 1997. A co-integration and error correction model was used to provide the empirical evidence for comparisons. The results of the study revealed a long-run positive relationship between economic growth and inflations rate. There are also other studies which have revealed positive relationships between economic growth and inflation rate (Phillips, 1958; Tobin, 1965; Mundell, 1965; De Gregorio, 1996). These results are in consistent with the structuralist's approach.

On the other hand, Sidrauski (1967) suggested no relationship between economic growth rate and inflation and Paul et al (1997) found no relationship in 40% of the countries investigated in one study and a negative relationship in 20% of the sample.

However, recent studies have revealed a negative relationship between the two variables in line with the monetarists approach. A study conducted in Mexico in the period 1970-2007 by Adrián Risso & Sánchez Carrera (2009), on the relationship between economic growth and inflation rate using co-integrated vector suggested a negative relationship between the two variables. This study established also the causal relationship of the two series using the robust Ginger causality test without finding the directional causality between them.

In Tanzania, Kasid & Mwakanemela (2013) investigated the relationship between economic growth and inflation rate. Correlation coefficient and co-integration methods were used on the data covering the period from 1990 to 2011 and the results suggested a negative relationship between the two variables. The study also measured the extent to which the economic growth rate responds to the changes in inflation.

A recent study by Zubaidi Baharumshah & Soon (2014) examined the relationship between inflation and economic growth in the context of Malaysia. The study employed Autoregressive Conditional Heteroscedasticity Model on the data covering the period 1957- 1971. The results of the study revealed a negative result between the relationships of the two variable.

3. Data

We obtained the data from The IMF database and the Bank of Zambia website. The inflation rate was measured using the average consumer price index (CPI) while the economic growth rate was measured using the real GDP growth percentage for the period from 1995-2017.

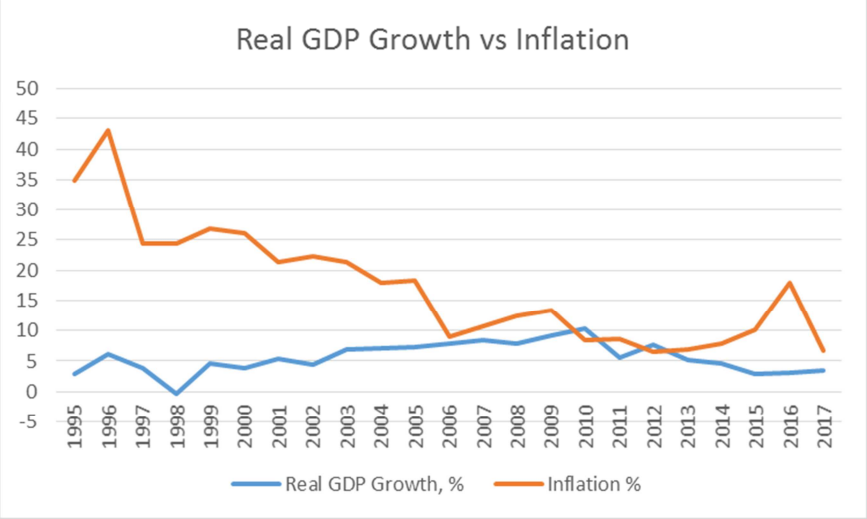

Figure 1. Economic growth and inflation rate trends.

Source: Authors

From figure 1, it can be seen that the country recorded the highest inflation rate of 43% and the economic growth rate of 6.2%. This is the period Zambia experienced economic recession after the transition from one party state to Multiparty which took place in 1991 followed the liberation of the economy in the subsequent years. All in all it seems that there is a positive relationship between economic growth rate and inflation. However, co-integration analysis and the Error Correction model was applied to investigate the relationship further.

4. Methodology

Johansen Co-integration was used to estimate the long run relationship between economic growth and inflation while Error Correction Model was used to check the short run relationship. Annual data covering a period of 22 years ranging from 1995 to 2017 was used

5. Data Analysis

5.1. Diagnostic Tests

Diagnostic tests for the variables were done before any tests could be performed. The first diagnosis test that was done were to check the normality of the dependent variable economic growth. This was done using Jarque-Bera statistics. If the Jarque-Bera probability test is non-significant ($p > 0.05$), it tells that the distribution in the sample is not significantly different from a normal distribution. The Jarque-Bera statist of 0.1854 with the probability of 0.9114 was observed, indicating that the dependent variable economic growth was normally distributed.

The second diagnosis test was the unit root test, this test was done to confirm the stationary properties of the data and in order to understand the order of integration. The results of the unit root tests using the Augmented Dickey-Fuller (ADF) tests based on trend and intercept are presented in table 1 below.

Table 1. Summary of ADF Unit Root Test Results.

Variable	Differencing				Order of integration
	Levels		First Difference		
	t-value	p-value	t-value	p-value	
GDP growth rate	-2.1814	0.4759	-7.0649	0.0001	I(I)
Inflation rate	-0.3113	0.1277	-7.6854	0.0000	I(I)
			Level		1st Dif
Test Critical Values		1% Level	-4.440		-4.4689
		5% Level	-3.632		-3.644
		10% level	-3.256		-3.2614

Source: Generated by the authors (2018)

As can be observed from table 1 above both GDP growth rate and Inflation rate had unit root at level because the ADF statistic (tα) 2.1814 for GDP growth and 0.3113 for inflation is not greater than the critical values of 4.440739, 3.632896 and 3.254671 in absolute terms at all the levels of significance (1%, 5% and 10%) and the P values of 0.4759 and 0.1277 are not significant this meant that the two variables were not stationary at level. After the first difference both variable were stationary as (tα) 7.0649 for GDP growth and 7.6854 for inflation is not greater than the critical values of 4.467895, 3.644963 and 3.261452 in absolute terms at all the levels of significance (1%, 5% and 10%) and the P values of 0.0001 and 0.0000 are significant This meant that the two variables were stationary thus integrated of the order one I (1)

5.2. Johansen Co-integration Test

Having satisfied the diagnosis test the Johansen co-integration was done in order to estimate the long run relationship between GDP growth and Inflation. Table 2 shows the results for this test.

Table 2. Co-integration Rank Trace Test Analysis results.

Co-integrated variable	Hypothesized No. of CE(s)	Eigevalue	Trace statistic	0.5 Critical value	Prob
GDP growth	None	0.5514	17.668	15.494	0.02
Inflation	At most 1	0.0389	0.8335	3.8414	0.36

Source: Generated by the authors (2018)

The results for Johansson co-integration test in table 2 shows that there is co-integration as the trace statist value of 17.6686 is more than the critical value of 15.4947 and the probability value of 0.02 is significant. Confirming the long run relationship between GDP growth rate and Inflation rate.

Since the variables were co-integrated, the following co-integrating equation was estimated using Vector Error Correction.

$$GDP = 13.599 - 0.4576\ INF + E$$

Where

GDP: is the economic growth rate

INF: is the Inflation rate

E: is the Error term

From the equation, it was observed that that holding inflation to a constant zero, economic growth rate will be 13.599%. Further, a unit increase in inflation will lead to a decrease in economic growth by 0.4576 units. This means that using the Zambian data, Inflation has as a long run negative relationship on economic growth. The negative relationship is logical because an increase in inflation means that prices have risen. This results in the decline in the purchasing power of money, which reduces consumption and therefore GDP decreases. This result is Similar to Adrián Risso & Sánchez Carrera (2009), Kasid & Mwakanemela (2013) and Zubaidi Baharumshah & Soon (2014)

5.3. Short Run Estimation Based on Error Correction Model (ECM).

To check if the economic growth rate and inflation had a short run relationship, Error Correction Model (ECM) was done. The result in table 3 shows that there is no significant short run relationship between economic growth rate and inflation as the inflation had a coefficient of 0.0092 and an insignificant p value of 0.9138.

Table 3. ECM Short Run Results.

Variable	Coefficient	t-statistic	Prob
C	0.099517	0.212818	0.8337
Inflation Rate	0.009219	0.109704	0.9138
Error Correction Variable	-0.444752	-2.043651	0.0051

Source: Generated by the authors (2018)

6. Conclusion

This study investigated the response of economic growth to fluctuation in inflation. Johansen Co-integration was used to estimate the long run relationship between economic growth and inflation while Error Correction Model was used to check the short run relationship using the annual data covering the period of 22 years from 1995 to 2017. The unit root test performed using the ADF showed that the two variables were stationary-integrated of the order one I (1). By employing the Johansen co-integration analysis the results indicated the existence of long run relationship. An increase in inflation rate results into a decrease in economic growth rate like found by other studies (Adrián Risso & Sánchez Carrera, 2009; Kasid & Mwakanemela, 2013; Zubaidi Baharumshah & Soon, 2014). However, the Error Correction Model showed that there is no significant short run relationship.

This empirical review reinforces the view that if policy makers control the inflation it would lead to price stability and increased domestic purchasing power hence economic growth in the long run.

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