Developing Country Studies
ISSN 2224-607X (Paper) ISSN 2225-0565 (Online)
Vol.6, No.5, 2016

A study of the Effectiveness of the Monetary Policy Rate as a Tool of Inflation Control in Zambia

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Abstract

The importance of a stable and favorable rate of inflation cannot be over emphasized. The main aim of the study was to assess the effectiveness of the Bank of Zambia Policy Rate in maintaining favorable inflation levels in Zambia.

This study investigated the relationship between the policy rate and the rate of inflation in the country. This study included the analysis of specific economic data for the period April 2012 to December 2014.

The study involved the review Bank of Zambia fortnightly reports for the stated period; Monetary Policy Rate, Inflation Rate and Exchange Statistics were extracted from the reports and two models were built to mimic the period before the implementation of the policy rate and the period after. Exchange rates were used as a control variable.

The interpretation of the models showed that the policy rate had little or no impact on the rate of inflation as the variations in the rate of inflation due to those in the policy rate were already explained by variations in exchange rates. The study further proposed recommendations to improve the management of inflation.

Keywords: Monetary policy rate, Inflation control, Monetary Policy

1. Introduction

The principal purpose of the Bank of Zambia is to "formulate and implement monetary and supervisory policies that achieve and maintain price stability and promote financial system stability in the Republic of Zambia" (BOZ Monetary Policy Statement, December 2012).

A central bank can adopt one of three types of monetary frameworks in its endeavor to maintain favorable commodity prices; these include money targeting, interest rate targeting and exchange rate targeting.

In many countries, exchange rate targeting is not an option, because either the country (or block of countries) is too large or because there is no country whose currency is an obvious choice to serve as the nominal anchor (Eduard J. Bomhoff, 1992).

A central bank is faced with two options of domestic methods of providing a nominal anchor to an economy, i.e. money targeting and interest rate targeting.

In the 1970s, money targeting was adopted by several countries, notably Germany, Switzerland, Canada, the United Kingdom, and Japan, as well as in the United States. This strategy involves using monetary aggregates as an intermediate target to achieve an ultimate goal such as price stability. Money targeting as practiced was quite different from Milton Friedman's suggestion that the chosen monetary aggregate be targeted to grow at a constant rate. Indeed, in all these countries the central banks never adhered to strict, ironclad rules for monetary growth and in some of these countries money targeting was not pursued very seriously. Money targeting is also known as money growth targeting or monetary targeting.

Mankiw and Miron (1986) related interest rate targeting to the active targeting of interest rates by the central bank. Mankiw and Miron (1986) postulated that by targeting the overnight interbank lending rate, a central bank could effectively enjoy a substantial control over this rate and in turn longer term yields. Proponents of interest rate targeting believe this approach to be less susceptible to money demand shocks.

A central bank has to make a choice between the two domestic methods. An omniscient central bank would be indifferent because the methods are equivalent in terms of resource costs; a realistic bank has to compare the information requirements of both methods and decide which will work best in an uncertain world (Eduard J.

Bomhoff, 1992).

2. Empirical Case Study

2.1 Background

During the period 1964 to 1991, Zambia did not have a clear monetary framework; prior to 1992 monetary policy had multiple objectives. Targets had also not been well defined and the implementation of monetary policy relied mainly on direct instruments which included fixed interest rates and credit allocation, core liquid assets and statutory reserve requirements (D. H. Kalyalya, 2001). Equally important, the financing of the Government fiscal budget relied heavily on central bank borrowing. As a result of the not so well developed financial system as well as structural rigidness in the economy, such as heavy dependency on production and export of copper, an inefficient industrial strategy of import substitution and inefficient public sector pushed the economy into a state of stagflation.

During the period 1991 to 2011, in its conduct of monetary policy, the central bank placed great reliance on indirect than on direct instruments. That is, the bank tried to influence the behaviour of the financial institutions and other market players through the operations of the market mechanism rather than through administrative controls, as had been the case previously. Apart from being in line with the Government policy of economic liberalization, indirect instruments offer greater scope for efficient resource allocation than direct instruments. They also enhance the effectiveness of monetary policy in reducing and stabilizing the growth of money supply and subsequently inflation in the short and long run.

Equally important, indirect instruments promote the emergence of efficient financial intermediation, which enhances the efficiency of money and capital markets (Alexander, et al., 1995).

A good number of successes were recorded as a result of government's change of stance on monetary policy. In early 1992, a few months after Zambia held its first multiparty democratic elections, the country signed an agreement with the IMF for a shadow programme through the first half of the year to be monitored informally by the IMF staff. In July of the same year, the Fund approved Zambia's Rights Accumulation Programme (RAP) for the next three and a half years, with a maximum amount of SDR 836.9 million or 309.6 per cent of quota. Zambia managed to graduate successfully from RAP to SAF/ESAF (Structural Adjustment Facility/Enhanced to Structural Adjustment Facility) in December 1995. Since then she had been on ESAF, which was transformed into the Poverty Reduction and Growth Facility (PRGF) in 1999. As could be expected, being on a Fund programme and given the amount of resources Zambia had accessed as a result (SDR 898.37 million or 183.7 per cent of quota), she had observed and continues to observe a number of performance criteria and benchmarks (D. H. Kalyalya, 2001).

During the first half of 2012 monetary policy continued to focus on the attainment of the end-year annual inflation target of 7.0%. In line with the objective of improving the conduct of monetary policy, the bank in April 2012, introduced the debut Bank of Zambia (BoZ) Policy Rate also known as the Monetary Policy Rate, whose objective was to better anchor inflation expectations and influence commercial banks' decisions on pricing credit products. The BoZ Policy Rate was set and maintained at 9.0% during the second quarter (Bank of Zambia, Communique, March 2012).

The performance of monetary policy during the first half of 2012 was favorable (BOZ Monetary Policy Statement, December 2012). Following the introduction of the Policy Rate, the operational target of monetary policy changed from reserve money to the overnight interbank rate. During that period, monetary policy was aimed at maintaining the 30-day moving average of the overnight interbank rate around 9.0%, but within a corridor of 7% and 11% (BOZ Monetary Policy Statement, December 2012).

The policy rate has been adjusted over the past years and as at December 31, 2014 it stood at 12.5 per cent.

This study endeavored to measure the relationship between the policy rate and the rate of inflation in the country, the study further compared the performance of inflation during the period before the introduction of the policy rate and the aftermath. The study also aimed at explaining the factors that necessitated the introduction of the policy rate and consequently the factors that determine its current rate.

2.2 Review of similar studies

A study conducted by Karanu Njogu at Kenyatta University of Kenya provided insight on the relationship between monetary policy and inflation. The study had two major objectives; the first was to establish the relationship between money supply and inflation while the second was to measure the effectiveness of monetary

policy in its endeavor to control inflation. The author identified three major factors that affect inflation, i.e. money supply, the exchange rate and commercial bank interest rates. The author analyzed figures for inflation, money supply, exchange rates and interest rates for Kenya for the period 2001 to 2010. From the analysis, money supply was found out to be most significant factor affecting the rate of inflation;when money supply increased by one hundred billion the rate of inflation increased by 5.478. Also, it was evident that there existed a positive relationship between foreign exchange rate and the rate of inflation; when the currency depreciated at a rate of one, inflation increased at a rate of 0.233. The research also showed that there existed a negative relationship between the rate of inflation and the commercial banks interest rates. When the commercial banks interest rates increased by one percent, the rate of inflation reduced by 0.84, thus proving that interest rates are one way of controlling the rate of inflation.

Another research by Michał Brzoza-Brzezina of the Research Department of the National Bank of Poland and Chair of Monetary Policy (Warsaw School of Economics) aimed to test, whether a simple equation, of the form introduced to the economic literature by the quantity theory, could be found and empirically verified for the long-run relationship between the real interest rate gap and inflation. In other words, it aimed to check whether there was a long-run path for inflation, determined by the interest rate gaps that actual inflation was co-integrated with. When describing the relationship, the researcher naturally ignored short-run dynamics and the influence of external shocks, these however could be the reasons for temporary divergences between actual and equilibrium inflation rates. The results, based on co-integration analysis, showed that such a stable long-run equation linked the growth rate of inflation to the interest rate gap. Thus, at least with respect to inflationary processes, the economy seemed to work like a space shuttle, that once accelerated, would cruise at a stable speed without the use of engines. The central bank could open the interest rate gap to accelerate inflation, and once that had happened the gap could be closed and inflation would remain at the higher level. The natural rate of interest, although certainly not constant, is stable enough, to allow us determine the interest rate gap by means of changes in the real interest rate. Using the calculated average value of the natural rate we can easier guess what the current stance of monetary policy is.

Eduard J. Bomhoff proposed in this paper that a central bank is faced with three options in its endeavor to provide an economy with a nominal anchor for which it is responsible. These options include; exchange-rate targeting, money targeting and interest rate targeting. Exchange-rate targeting means that the anchoring takes place on foreign soil, Zimbabwe adopted this strategy in the 2009 after a record high hyperinflation. Very few countries look to this option because it exposes the country to the risk of inheriting foreign problems. Any good meaning central bank is therefore faced with two domestic options of providing a nominal anchor; interest-rate targeting and money targeting. An omniscient central bank would be indifferent, because the methods are equivalent in terms of resource cost. The central bank has to compare the information requirements of both methods to decide which will work best in an uncertain world. The types of uncertainty that most affect the economy are crucial because different economic surprises have different effects on the degree to which the central bank can attain its targets.

The basic relations needed for a simple model of monetary policy are, therefore, a demand-for-money schedule and the definition of the real rate of interest as the difference between the nominal rate and the expected rate of interest. In the second part of his paper, Bomhoff described one such model, that of Robert Barro (1989). Barro's model allowed for a limited number of shocks, postulated fully flexible prices and implied that interest-rate targeting had benefits and no costs over money-targeting. Bomhoff, in the third section of his paper developed an alternative model that was similar to Barro's model but had some degree of sluggishness in prices and a richer menu of stochastic shocks. Bomhoff then went on to perform simulations of the different models using United States data, the principal result of the simulations was that interest-rate targeting becomes inferior to monetary targeting as soon as the assumption of price flexibility was abandoned. Barro's results were seen to be quite model specific. For a variety of assumptions regarding the importance of different types of shocks to the economy, Bomhoff found monetary-targeting results in superior steering of the rate of inflation over time.

2.3 Theoretical framework

From review of existing literature, it was observed that there exists a number of models that can used to explain the relationship between interest rates and inflation. This study was based two models i.e. the Taylor Rule and the IS-LM Model

2.3.1 Taylor Rule

The Taylor Rule is an interest rate forecasting model invented and perfected by famed economist John Taylor in 1992 and outlined in his landmark 1993 study "Discretion vs. Policy Rules in Practice".

Taylor operated in the early 1990s with credible assumptions that the Federal Reserve determined future interest rates based on the rational expectations theory of macroeconomics. This is a backward-looking model that assumes that if workers, consumers and firms have positive expectations for the future of the economy, interest rates don't need an adjustment. The problem with this model is not only that it is backward looking, but also that it doesn't take into account long-term economic prospects. Taylor developed the formula below to explain his model:

$$\mathbf{I = r^* + pi + 0.5\ (pi-pi^*) + 0.5\ (y-y^*).} \qquad \mathbf{(1)}$$

Where:

I = nominal fed funds rate
r* = real federal funds rate (usually 2%)
pi = rate of inflation
p* = target inflation rate
Y = logarithm of real output
y* = logarithm of potential output

The equation above shows that there is a difference between a nominal and real interest rate, i.e.; inflation. Real interest rates are factored for inflation while nominal rates are not. Thus when looking at possible targets of interest rates, one has to factor it in. To compare rates of inflation or non-inflation, one must look at the total picture of an economy in terms of prices.

2.3.2 IS-LM Model

According to the IS-LM model, interest rate targeting is most ideal in an economy where LM shocks are dominate. A combination of interest rate targeting and money targeting can be adopted in an economy where both IS and LM shocks are dominate.

The IS–LM model, or Hicks–Hansen model, is a macroeconomic tool that demonstrates the relationship between interest rates and real output, in the goods and services market and the money market (also known as the assets market). The intersection of the "investment–saving" (IS) and "liquidity preference–money supply" (LM) curves is the "general equilibrium" where there is simultaneous equilibrium in both markets. Two equivalent interpretations are possible: first, the IS–LM model explains changes in national income when the price level is fixed in the short-run; second, the IS–LM model shows why the aggregate demand curve shifts. Hence, this tool is sometimes used not only to analyze the fluctuations of the economy but also to find appropriate stabilization policies.

2.4 Conceptual Framework

The purpose of the Bank of Zambia Policy Rate was to serve as a benchmark or reference point for commercial banks when they are setting their respective interest rates. The policy rate was designed to influence the operation of other policy tools like the open market operations, statutory reserve ratio and the discount rate (Bank of Zambia, 2010). The policy tools would then influence the operation of the interbank rate which would in turn influence the whole term structure of interest rates in the economy including commercial banks interest rates. Commercial banks add an appropriate markup to the interbank rate when computing their individual lending rates (Bomhoff, 1992). In general, as the Bank of Zambia lowers its policy rate, commercial banks react in a similar fashion by lowering their interest rates, more people are able to borrow more money. The result is that consumers have more money to spend, causing the economy to grow and inflation to increase (Alexander and Enoch, 1995). The opposite holds true for rising interest rates. As interest rates are increased, consumers tend to have less money to spend. With less spending, the economy slows and inflation decreases. This relationship is depicted in figure 21.

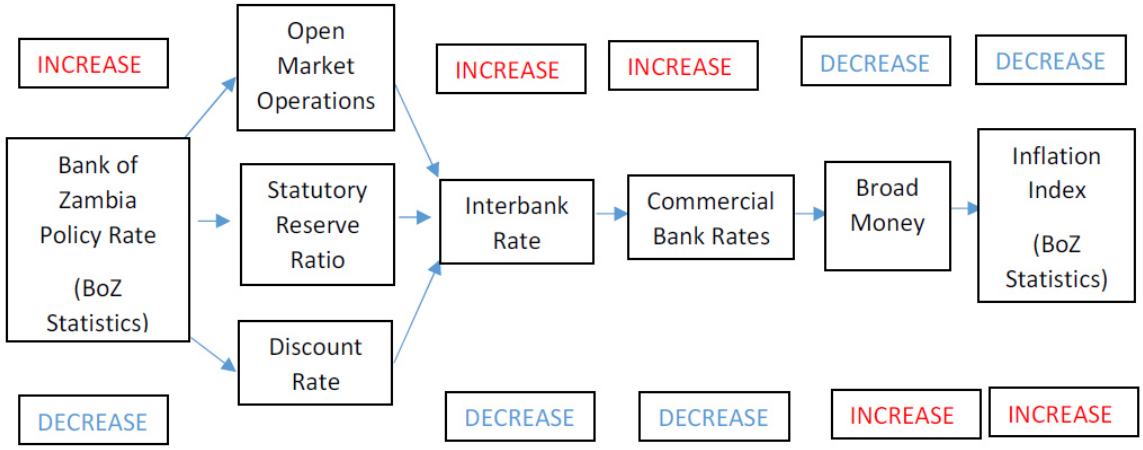
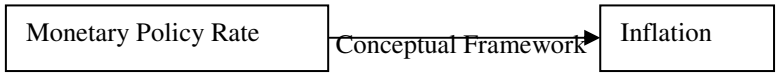


Figure 2.1 Bank of Zambia Policy Rate vs. Inflation

From the model above, we produced o the conceptual framework of the study as shown in figure 2.2 below.



Two models were built to represent the relationship between the monetary policy rate and the rate of inflation;

$$y = \alpha + \beta_1 x_1 + \epsilon; \quad (2)$$

$$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \epsilon; \quad (3)$$

Where y = Inflation rate,

α = Inflation when the exchange rate is equated to zero, in the case of model 2 or the rate of inflation when both the exchange rate and the policy rate are equated to zero, i.e. model 3.

β_1= Coefficient of the exchange rate,

x_1= Exchange rate,

β_2 = Coefficient of the monetary policy rate,

x_2 = Monetary policy rate

ϵ = Error term.

This study focused on two variables; the Bank of Zambia policy rate and the Inflation Index. The working theory was that an increase in the policy rate would result in an increase in the interbank rate and subsequently an increase in commercial bank lending rates, which would in turn result in a decrease in the demand for loans and in a general sense, money. The reduction in money demand would cause a reduction in spending and investment thereby effecting a reduction in inflation. A reduction in the policy rate would cause a similar effect in the opposite direction.

A 2-stage linear regression analysis was used to deduce the model of the above relationship while using the prevailing exchange rates as a control variable.

2.5 Research Hypothesis

The following hypothesis was formulated to guide the study.

Ho_1: Introduction of the Bank of Zambia policy rate had no impact on the rate of inflation in the country as measured by the inflation index.

Ha_1: Introduction of the Bank of Zambia policy rate had an impact on the rate of inflation in the country as measured by the inflation index.

3. Research Methodology

In order to evaluate the correlation between the Bank of Zambia policy rate and the rate of inflation in the

country, a regression model was built from data recorded over the period July 2012 to December 2014 using a case study method. Exchange rate statistics for the specified period were used as a control variable.

The case study comprised a detailed investigation of the Zambian economy over the stated period with emphasis on inflation and the policy rate. The use of a case study to assess the correlation between the policy rate and the rate of inflation provided more insight and understanding of the relationship between the two variables and the intermediary variables that play an import role in the transmission of developments between the two variables.

The deduced model was subjected to tests for normality and linearity; a Normal P-P Regression Standardized Residual and a scatter diagram would be used to achieve this purpose.

3.1 Data

The research was quantitative. Data was collected from monthly Bank of Zambia fortnightly reports for the period April 2012 to December 2014 and verified against monthly reports from the Central Statistics Office.

The figure below depicts the trends of the policy rate, inflation rate and exchange rates for the specified period.

Figure 3.1 Inflation, Policy Rate and Exchange Rates 2012 -2014

4. Data Analysis

4.1 Regression results

To measure the effectiveness of the policy rate in its endeavours, the author used a 2-stage regression analysis to measure the correlation between the policy rate and the rate of inflation while holding exchange rates constant. The regression analysis yielded the following results:

Table 4.1 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.920[a]	0.846	0.841	0.21895
2	0.923[b]	0.851	0.841	0.21883

a. Predictors: (Constant),Exchange Rate
b. Predictors: (Constant), Exchange Rate, Monetary Policy Rate

Source: Author

Table 4.2 *ANOVA*[a]

Model		Sum of Squares	Df	Mean Square	F	Sig
1	Regression	8.164	1	8.164	170.293	0.000[b]
	Residual	1.486	31	0.048		
	Total	9.650	32			
2	Regression	8.213	2	4.107	85.753	0.000[c]
	Residual	1.437	30	0.048		
	Total	9.650	32			

a. Dependent Variable: Inflation Rate

b. Predictors: (Constant), Exchange Rate
c. Predictors: (Constant), Exchange Rate, Monetary Policy Rate

Table 4.3: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig (p-value)
		B	Std. Error	Beta		
1	(Constant)	1.349	0.450		2.999	0.05
	Exchange Rate	1.045	0.080	0.920	13.050	0.00
2	(Constant)	1.701	0.568		2.997	0.05
	Exchange Rate	0.802	0.252	0.706	3.181	0.03
	Policy Rate	0.100	0.098	0.226	1.016	0.318

a. Dependent Variable: Inflation Rate

Source: Author

Table 4.4: Excluded Variables

Model	Beta In	t	Sig.	Partial Correlation	Collinearity Statistic
					Tolerance
1. Monetary Policy Rate	0.226[b]	1.016	0.318	0.182	0.101

a. Dependent Variable: Inflation Rate
b. Predictors in the Model: (Constant), Exchange Rate

Source: Author

Table 4.5: Correlations

		Inflation Rate	Policy Rate	Exchange Rate
Inflation Rate	Pearson Correlation	1	0.895**	0.920**
	Sig. (2-tailed)		0.000	0.000
	N	33	33	33
Policy Rate	Pearson Correlation	0.895**	1	0.948**
	Sig. (2-tailed)	0.000		0.000
	N	33	33	33
Exchange Rate	Pearson Correlation	0.920**	0.948**	1
	Sig. (2-tailed)	0.000	0.000	
	N	33	33	33

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author's formulation

The analysis produced two models of the order;

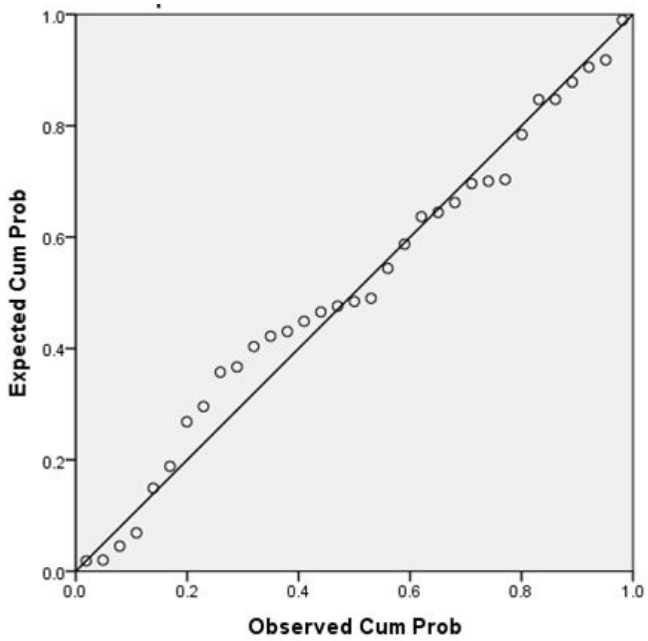
$$y = 1.349 + 1.045x_1 + \epsilon; \quad (4)$$

$$y = 1.701 + 0.802x_1 + 0.1x_2 + \epsilon; \quad (5)$$

Where y is the inflation rate and x_1 is the exchange rate and x_2 Bank of Zambia Policy Rate.

4.2 Test for Normality

A normal p-p plot of regression standardized residual was used to test whether the computed model met the assumptions of a regression model. Figure 4.1 shows the findings.



a. Dependent variable: Inflation Rate

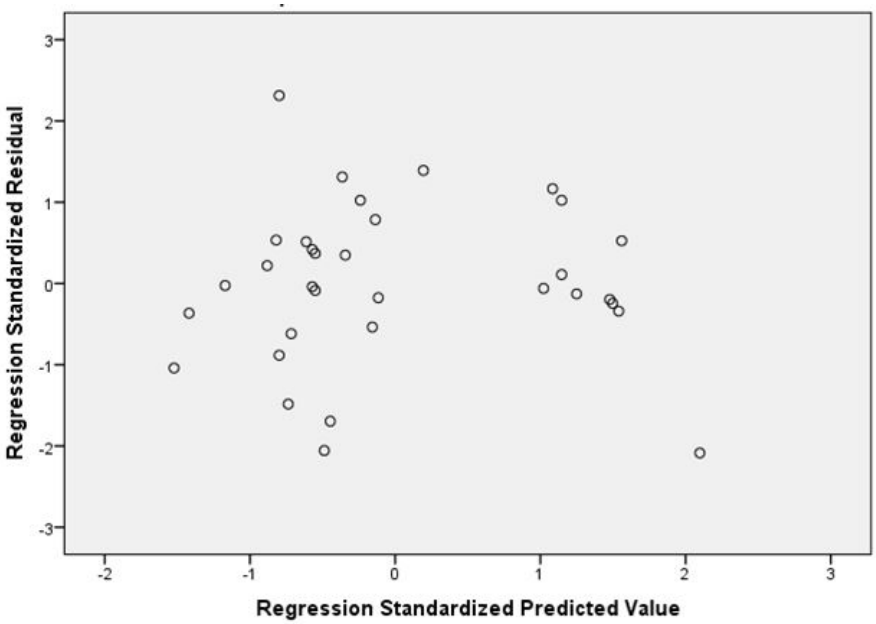
Figure 4.1 Normal P-P Regression Standardized Residual

Source: Author

Figure 4.1 overleaf shows that most of the observations fell along the computed model thus proving that the model was a very good description of the data.

4.3 Test for Linearity

A scatter diagram was used to test for linearity and figure 4.2 depicts the findings.



a. Dependent variable: Inflation Rate

Figure 4.2: Scatterplot

Source: Author

From the figure, it can be observed that the predicted values form a random pattern centered around the line of zero standard residual value. The points seem to have the same dispersion about the line over the predicted value rage. The dispersion of residuals over the predicted value range between -1 and 1 looked constant, for predicted values below -1 there were too few points to provide evidence against a change in variability.

4.4 Interpretation of ANOVA

On a one to one scale, the regression analysis comparing the monetary policy rate to the rate of inflation had a p-value of 0.000 meaning the policy rate had a significant impact on the rate of inflation. The calculated Pearson correlation between the two variables was 0.895 meaning that there existed a very strong relationship between the two variables. The calculated R^2 of the model was 0.801 meaning that 80.1 percent of variations in the rate of inflation were explained by variations in the policy rate. This analysis proceeded with the assumption that the policy rate was the only factor affecting the rate of inflation in the country. This however was not the case; other factors affecting the rate of inflation in the country included exchange rates, political and social happenings, domestic and international developments, among others (Kuosmanen, Nkalamo and Mtonga 1996). One major determinant of the rate of inflation in the country is the value of the local currency in comparison to other major currencies like the United States Dollar, British Sterling and the South African Rand (Kamwi, 2011). A 2-stage regression analysis was used to measure the correlation between the policy rate and inflation while controlling for the exchange rate, the exchange rate was also used as a control variable due to the fact that it was a common variable to both the pre-implementation and post-implementation period of the policy rate. The dollar was used in the analysis since most foreign exchange transactions were quoted in that currency. Before the introduction of the policy rate, the exchange rate had a p-value of 0.000 meaning that the exchange rate had a significant impact on the rate of inflation. After the introduction of the policy rate, the p-value of the exchange rate shifted to 0.03 while that of the policy rate was calculated at 0.318. This meant that at 95 percent confidence levels the exchange rate maintained as a major factor in the determination of the rate of inflation while the policy was not.

A further analysis of the individual correlation of the policy rate and the exchange rate to the rate of inflation revealed that two independent variables were both highly correlated to the inflation rate. The policy rate had a Pearson correlation of 0.895 while the exchange rate recorded 0.920 meaning that the was an 89.5 percent level of correlation between the policy rate and the rate of inflation and their existed 92 percent level of correlation between the exchange rate and the rate of inflation. Such high levels of correlation meant that the two variables could not be used to target the rate of inflation at the same as they seemed to target the same factors affecting the rate of inflation.

The policy rate was automatically removed from the model as it proved to have little influence on the rate of inflation with the exchange rate explaining most of the variations in the rate of inflation. The findings were consistent with the findings of the study titled “Exchange Rate, Inflation and Macroeconomic Performance in the WAMZ” conducted in 2012 (Tarawalie, Sissoho, Conte and Ahortor, 2012) whose results suggested that exchange rates had a significant impact on inflation in all the member states of the West African Monetary Zone (WAMZ). The results revealed a negative relationship between real exchange rate and real GDP growth for both Liberia and Sierra Leone, implying that depreciation of the real exchange rates in these countries could lead to output growth. However, the impact of exchange rates on output in The Gambia, Ghana, Guinea and Nigeria though positive, remained weak, which was partly due to supply side factors as evident from the result.

4.5 Interpretation of the Equation

A 2-stage regression analysis was used to model the relationship between the policy rate and the rate of inflation. To achieve this, exchange rates were used as a control variable. Initially a model was built to represent the relationship between the exchange rate and the rate of inflation; this was done to model the policy rate pre-implementation state of the economy. The analysis yielded the model shown below.

$$y = 1.349 + 1.045x_1 + \epsilon; \quad (4)$$

According to the model, when the exchange rate was equated to zero, the rate of inflation would be 1.349; i.e. the constant of the equation. The exchange rate had a coefficient of 1.045 meaning that when the exchange rate was raised by 1 percent, the rate of inflation in the country would rise by 1.045 percent.

A second model was built to factor in the introduction of the policy rate; this is shown in the model below.

$$y = 1.701 + 0.802x_1 + 0.1x_2 + \epsilon; \quad (5)$$

According to the second model, the constant of the equation shifted to 1.701 meaning that the rate of inflation would be equated to 1.701 when exchange rates and the policy rate were set to zero. The coefficient of exchange rates was calculated as 0.802 meaning that the rate of inflation would increase by 0.802 percent when exchange rates increased by 1 percent. The coefficient of the policy rate was calculated as 0.1 meaning that a 1 percent positive change in the policy rate would result in only a 0.1 positive percent change in the rate of inflation. The polarity of the coefficient of the policy was against the proposed theoretical framework of the study which suggested that an increase in the value of the policy rate would result in a decrease in the rate of inflation. This

discovery pointed to the ineffective impact the policy rate had on the rate on the rate of inflation; despite several increases in the value of the policy rate, the rate of inflation in Zambia maintained an upward trend in the period under review.

The finding above implied that changes in the policy rate had little impact on the rate of inflation in the country; this was consistent with the findings of the study conducted by the Bank of Zambia titled "Survey on How Commercial Banks Determine Lending Interest Rates in Zambia" in the year 2010 (Bank of Zambia, 2010) where the author alluded to the fact that the policy rate would have little or no impact on the prevailing interest rates and subsequently the rate of inflation in the country so long as the policy rate was meant to target the interbank rate. The cited Bank of Zambia report revealed that very few banks accessed the interbank market and those that did accessed the market to fund short term requests from their clients. Due to the short term nature of the interbank market, most commercial banks did not factor in the interbank rate when setting interest rates of their loan facilities.

4.6 Interpretation of regression statistics

Using the 2-stage linear regression, two models were built to simulate the pre-implementation and the post-implementation effect of the policy rate on the rate of inflation in the country. The first model compared the exchange rate to the rate of inflation and its computed R – value was 0.920. This was the correlation coefficient meaning that there was a strong linear relationship between the rate of inflation and the Exchange Rates. The model went further to compute the corrected or adjusted R^2- value of 0.841. This was the coefficient of determination meaning that 84.1 percent of the variations in the inflation rate could be explained by variations in the Exchange Rates.

The second model included the exchange rates and the monetary policy rate as determinants of the rate of inflation in the country. This model had a calculated R – value of 0.923 meaning that there was a strong linear relationship between the two cited independent variables and the rate of inflation. The computed R^2- value maintained at 0.841 meaning that 84.1 percent of variations in inflation were explainable by variations in the two cited variables, i.e. exchange rates and the monetary policy rate.

The computed R^2- value remained unchanged in the two models. This meant that after the introduction of the policy rate, the percentage of variations explained by either the exchange rate or the sum effect of the exchange rates and the policy rate was the same. This finding meant that the introduction of the policy had no or little effect on the rate of inflation, since the variations in inflation were already explained by the exchange rate. This finding was also consistent with the findings of the Bank of Zambia survey of 2010 on the determinants of interest rates in the country.

5 Conclusions and Recommendations

The analysis showed that under the assumption that the policy rate was the only factor affecting inflation; a strong linear relationship existed between the policy rate and inflation. However, after factoring in exchange rates in the analysis, it was discovered that the introduction of the policy rate had little or no significant impact on the rate of inflation as its percentage of variation explained in the rate of inflation was already explained by the exchange rate.

Two models were built to mimic the period before the policy rate and the period after. The value of the kwacha against the United States Dollar was used as a control variable in the study. In the first model; a regression which compared exchange rates and the rate of inflation, exchange rates had a p-value of 0.000. This proved that exchange rates were a serious determinant of inflation. In the second model, the influence of the policy rate was factored into the study. The ANOVA of the regression produced probability values (p-values) of 0.03 and 0.318 corresponding to exchange rates and the policy rate respectively, thus putting the analysis result in the acceptance area of the null hypothesis. This meant that at a 95 percent confidence level the policy rate had very little or no effect on the rate of inflation in Zambia thus leading to the acceptance of the null hypothesis that the Bank of Zambia policy rate had no impact on Inflation as measured by the Inflation Index.

Despite measures taken by Bank of Zambia to increase the policy rate and eventually target the rate of inflation in the country, inflation remained above the benchmark target of 7 percent (Bank of Zambia Monetary Policy Statement, December 2012). In the period under review, it was noted that the volume of currency in the economy had risen by 56.48 percent (Bank of Zambia Fortnightly Reports, 2012 – 2014) while the country's Gross Domestic Product during the same period experienced an average growth of 8.54 percent; i.e. 24.94 Billion Dollars in 2012, 26.82 in 2013 and 27.07 in 2014 (World Bank, 2014). The Bank of Zambia despite raising the Policy Rate by 38.9 percent, i.e. from its initial 9.0 percent to 12.5 percent at the close of study period, money supply and inflation maintained an upward trend; thus pointing to the failure of the policy rate to mop up excess

liquidity. The increase in money volume as measured by broad money could have been as a result of the increased infrastructure development and pay as you earn tax changes. The imbalance between increases in money volume and Gross Domestic Product contributed to the increased inflation. The government needed to take measures that would match money growth to general production. This would entail encouraging local production and in the process raise the country's gross domestic product.

Though inflation stayed below the 8.1 mark (Bank of Zambia, January 2015) most of the time, further action needed to be taken to reduce the rate of inflation in the country so as to stimulate investment and entrepreneurship. Such actions would include deliberate policies that supported the growth of the country's general output.

Further action needed to be taken to improve the inter-bank market system; the current setup prevented the effective and efficient transmission of monetary policy.

A study conducted by the Bank of Zambia in 2010 before the implementation of the policy rate revealed that most banks did not consider the interbank rate as a determinant of their lending rates. This observation rendered the policy rate ineffective in its efforts to better anchor inflation. The Bank of Zambia should consider targeting an economic factor that has an influence in the determination of interest rates in the country, like the operating costs of commercial banks.

This study went on to show that inflation rates were strongly correlated to exchange rates. During the period under review the Zambian kwacha had devalued by 21.38 percent (1 US Dollar was trading at 5.24 Kwacha in March 2012 and 6.34 at the end of December 2014) and inflation had risen by 21.54 percent i.e. 6.5 percent in March 2012 and 7.9 at the end of December 2014. This finding entailed that government needed to play an active role in the determination of exchange rates. A policy tool needed to be designed to actively target the prevailing exchange rates. Furthermore, a study needed to be conducted to determine the relationship between the policy rate and the exchange rate of the country; findings of such a study would help model the policy rate to better target inflation in Zambia's import dependent economy.

The policy rate did not provide adequate assurance that it had a substantial influence over money supply in the country. A study needed to be conducted to determine factors affecting money supply in the country and appropriate measures taken to balance money supply with general output; i.e. Gross Domestic Product, and eventually better manage inflation.

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