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The Monetary Policy Rate in the Control of Inflation in Ghana: A Theoretical Perspective

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Abstract

The purpose of the study was to assess the effectiveness of the monetary Policy regime adopted by Bank of Ghana in controlling inflation in the economy. This study specifically examined the relationship of interest rate, monetary policy rate, T-bill rate and Money supply on inflation in the Ghanaian context. The study was based on the Ex-post Facto research design method and the use of quantitative research approach. Secondary information was used from the bank of Ghana and Ghana statistical service. Data analysis was based on six variables used for a 11-year period (2006-2016). A time-series data estimation and correlation analysis were used to evaluate the effects and relationship of the exogenous variables on the endogenous variable respectively. The study found monetary policy rate, t- bill rate, and money supply to be statistically significant relationship with inflation except interest rate, which was statistically insignificant. In respect to the effect of these independent variables on inflation, the study reveals that all the independent variable have a statistically significant effect on Inflation at 1% significant level. The paper concluded that the R-square value is not more than 80%. It further concluded that price control, rationing and credit control can be used in controlling inflation in Ghana in addition to monetary policy rate.

Keywords

T-bill Rate, Monetary Policy Rate, Money Supply, Inflation, Interest Rate, Price Control, Rationing, Credit Control

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1. Introduction

The economic situation of every country is mostly based on the implementation of monetary policy by its Central Bank. Therefore, the primary aims and objectives of the Central bank is to pursue sound monetary and financial policies aimed at price stability as stipulated in the Bank of Ghana Act 2002, to create an enabling macroeconomic environment for the promotion of sustainable economic growth. To achieve this goal amongst many macroeconomic complexities, several financial tools have been adopted since its inception, with very little success since inflation continued to be a burden to economic growth in the country. In the early 1980's for instance inflation rose to more than 100% with persistent GDP decline which led to large fiscal deficits, and overvalued exchange rate.

During the periods in the 1970s and 1980s, the rate of inflation in Ghana climbed at a historical high of 123% in 1983[6].

Some of these indicators could be attributed to macroeconomic mismanagement and government controls. Nonetheless, the rates of inflation remained reasonably lower

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from 1984, due to the restructuring in fiscal and monetary policies, such as the direct monetary management control policy of 1983, the market-based monetary management scheme of 1992, inflation targeting of 2002, cost recovery measures, divestiture of state enterprises, reduction in subsidies, tax reforms, and retrenchment of civil servants [33, 7].

Prior to 2007, monetary policy framework in Ghana concentrated on monetary aggregates adopting money supply as the central monetary policy instrument in controlling inflation. The bank of Ghana formally adopted a new monetary policy framework known as inflation targeting in 2007, with the main goal of delivering price stability, contributing to economic growth, development and sustainability of the economy. This new policy was based on controlling liquidity and setting interest rates to reflect the underlying cost of capital and steering inflationary expectations. From that time, the inflation records of Ghana have been quite remarkable. The country recorded single digit inflation for 32 months from June 2010 (Inflation=9.50%) to January 2013 (inflation=8.80%). Monthly inflation persistently increased from February 2013 to November 2014 with 10% and 17% inflation rates respectively. Inflation reduced to 16.4% in January 2015 but again surged continuously on monthly basis to 19% in January 2016. By December 2016, inflation had declined to 15.4%. The monthly inflation for January, February and March stood at 13.30%, 13.20% and 12.80% respectively [13].

The remarkable and rapid disinflation at the inception of the inflation targeting regime has been met with certain level of scepticism by many policy makers and scholars and since in recent years, from 2012 to 2017, the level of inflation has steadily been on the rise, the disinflation achieved from the earliar introduction of the inflation targeting policy has however remained a topic for discussion in policy dialogue as to whether the outcome was in the right direction. Hence, the necessity to conduct the study and to establish the usefulness of using Ghana's monetary policy rate in controlling inflation.

1.1. Statement of the Problem

One of the most publicly discoursed economic indicators when it comes to the economic welfare and standard of living of Ghanaians is the persistent rise in the general price level. The high level of inflation causes instability in an economy since money does not hold its value for a long time. History has exposed that high rate of inflation is a serious macroeconomic problem and therefore creates complications for economic measurement. This brings about uncertainty in trying to look into the future [5].

Boafo and Gyebi [18] posit that, high and persistent inflation destabilizes public confidence in the economy with potentially adverse impact on risk-taking, investment and other productive activities. The impact of high inflation has made it difficult for some households to obtain certain basic needs such as foods, cloths, and other rudimentary necessities. Businesses on the other hand are discouraged from borrowing and investing in productive ventures as a result of high interest rates which is one of the direct effects of inflation. Furthermore, the balance of payments of a country is affected because as inflation rises, imports becomes cheaper leading to more import of foreign goods and services which turn to depreciates the country's currency.

The Bank of Ghana over the last decade has tried to curtail inflation using inflation – targeting as its monetary policy framework to control liquidity and set interest rates to reflect the underlying cost of capital and steer inflationary expectations. However, it appears monetary policy rate has failed to fully curb inflation, and price instability has caused high cost of living and poor standard of living. This has led to a debate in policy disclosure as too whether or not, inflation targeting is operational in controlling inflation in Ghana and why despite the efforts of the Bank of Ghana, does inflation persist.

The many questions surrounding the monetary policy regime used by Bank of Ghana in controlling inflation suggests that the effectiveness of monetary policy management has not been sufficiently investigated hence, this study intended to take a critical analysis of the monetary policy frameworks used in Ghana and determine how effective they are in curbing inflation.

1.2. Research Objectives

The objective of this study was to evaluate the effectiveness of the Monetary Policy regime adopted by Bank of Ghana in controlling inflation in the economy.

2. Literature Review

Numerous theories exist for the causes of inflation; arguably the two most influential schools of thought on inflation are those of the Keynesian and Monetarist Economics. These two schools of thoughts have a controversy on what constitute inflation, how its transmission mechanism works and how it can be controlled.

According to Fernando [15], the Keynesian school of thought derived its name and intellectual foundation from the British economist John Maynard Keynes (1883–1946). Although its modern interpretation continues to evolve, Keynesian economics is broadly characterized by its emphasis on

aggregate demand as the prime mover of economic development. As such, adherents of this tradition advocate government intervention through fiscal and monetary policy as a means of achieving desired economic outcomes, such as increasing employment or dampening the volatility of the business cycle. The Keynesian school claim that inflation originates from three sources: (i) Expansionary forces (Demand Pull inflation), (ii) rise in input prices (Cost Push Inflation) and (iii) Concentrated industries (Profit Inflation. Specifically, they distinguish between two broad types of inflation: cost-push inflation and demand-pull inflation.

Cost-push inflation decrease in the aggregate supply of goods and services resulting from an increase in the cost of production. Those factors, which include capital, land, labour and entrepreneurship are the essential inputs to produce goods and services.

Demand-pull inflation generally results from stimulative fiscal and monetary policies. There are instances, however, where they result from an excess of aggregate demand relative to aggregate supply in the private sector.

Monetarism is not clearly associated to a specific founding figure, but is nonetheless carefully related with the American economist Milton Friedman (1912–2006). As the name proposes, monetarism is concerned primarily with the role of money in influencing economic growths. Precisely, it is concerned with the economic effects of changes to the money supply.

2.1. Theoretical Review

2.1.1. Monetarists Theoretical View of Inflation

Monetarists claim that although short run inflation may have many sources, long term inflation is always a monetary phenomenon. They have historically explained inflation as a consequence of a rapidly expanding money supply more than output. They reject the notion that long run inflation can be caused by non – monetary factors such as expansive fiscal actions, cost – push influences, food and fuel shortages, etc. such factors they say can raise the price of certain products. But, unless accompanied by an excessive increase in the supply of money, the rise in the prices of these commodities will offset eventually by declines in prices of other commodities, leaving the average price unchanged. The monetarist view is perfectly encapsulated by Friedman's remark that "inflation is always and everywhere a monetary phenomenon." According to this view, the principal factor underlying inflation has little to do with things like labour, materials costs, or consumer demand. Instead, it is all about the supply of money. At the heart of the monetarists' perspective is the quantity theory of money.

2.1.2. The Quantity Theory of Money

The concept of the quantity theory of money (QTM) began in the 16th century. As gold and silver inflows from the Americas into Europe were being minted into coins, there was a resulting rise in inflation. This led economist Henry Thornton in 1802 to assume that more money equals more inflation and that an increase in money supply does not necessarily mean an increase in economic output [21].

The quantity theory of money states that there is a direct relationship between the quantity of money in an economy and the level of prices of goods and services sold. According to QTM, if the amount of money in an economy doubles, price levels also double, causing inflation (the percentage rate at which the level of prices is rising in an economy). The consumer therefore pays twice as much for the same amount of the good or service.

2.1.3. Calculations of the Quantity Theory of Money

In its simplest form, the theory is expressed as:

$MV = PT$ (*The Fisher Equation*)

Each variable denotes the following:

M = Money Supply

V = Velocity of Circulation (the number of times money changes hands)

P = Average Price Level

T = Volume of Transactions of Goods and Services

Implicit in this equation is the belief that if the velocity of money and the volume of transactions is constant, an increase (or decrease) in the supply of money will cause a corresponding increase (or decrease) in the average price level. Given that the velocity of money and the volume of transactions are in reality never constant, it follows that this relationship is not as straight forward as it may initially seem. Nevertheless, this equation serves as an effective model of the monetarists' belief that expansion of the money supply is the principal cause of inflation [21].

2.2. Monetary Policy

Monetary policy is the practice by which the fiscal authority of a state controls the supply of money, frequently targeting a rate of interest for the purpose of promoting economic growth and stability. Its official goal is to usually include relatively stable prices and low unemployment. In practice, all types of monetary policy involve transforming the amount of base currency in circulation. The central bank has three main instruments that it uses to conduct monetary policy: open market operations, changes in reserve requirements, and

changes in the discount rate. The process of changing the liquidity of base currency through the open sales and purchases of (government-issued) debt and credit instruments is called open market operations. When the central bank purchases government bonds, it increases the reserves of the banking sector, and by the multiple deposit expansion process, the supply of money increases. On the other hand, when the central bank offloads some of its stock of government bonds, the effect is a decrease in the supply of money. If the central bank increases bank reserve requirements, the banking sector's excess reserves are reduced, leading to a reduction in the supply of money; a decrease in reserve requirements induces an increase in the supply of money.

2.3. Inflation Targeting - General Concept and Implications

Inflation targeting is a central bank monetary policy strategy used for meeting and maintaining an already preset, publicly displayed targets for the annual rate of inflation. The benchmark used for inflation targeting is typically a price index of a basket of consumer goods, such as the Consumer Price Index (CPI) [23].

Beside with inflation target rates and calendar dates to be used as performance measures, an inflation targeting policy may also have established steps that are to be taken depending on how much the actual inflation rate varies from the targeted level, such as cutting lending rates or adding liquidity to the economy.

Another key feature of inflation-targeting management is that the transparency of policy associated with inflation targeting has inclined to make the central bank extremely accountable to the public. Continued success in the conduct of monetary policy as measured against a pre-announced and well-defined inflation target can be instrumental in building public support for an independent central bank.

However, opponents of inflation targeting have outlined seven major disadvantages of this monetary policy strategy. Four of those disadvantages include; that inflation targeting is too rigid, that it allows too much discretion, that it has the potential to increase output instability, and that it will lower economic growth.

2.4. Empirical Review

Numerous studies have been done in many countries on the impact of monetary policy instruments on macroeconomic variables such as inflation.

Amarasekara [8] examined the impact of monetary policy on inflation and economic growth in Sri Lanka. The impact of money supply growth, changes in exchange rate and interest rate on inflation and economic growth was analyzed using a vector autoregressive (VAR) framework using two lags. The study adopted a quarterly, seasonally adjusted data from 1978 to 2005 on variables such as interest rate, money supply, inflation and real GDP in Sri Lanka. Results from the study indicated that inflation in Sri Lanka does not fall after contractionary changes in monetary policy.

Gul et al [17] studied how monetary instruments influence macroeconomic variables such as, inflation, interest rate, real GDP, exchange rate and money supply in Pakistan. OLS was used to analyze and explain the relationship between the above mentioned variables. Secondary source of data from 1995 to 2010 was used. Results from the study showed that money supply has a strong positive correlation with inflation whereas a negative correlation with output. Exchange rate also has a negative impact on output in Pakistan.

Nchor et al [31], examined the effect of exchange rate depreciation and nominal interest rates on inflation in Ghana. The study used autoregressive distributed lag model and an unrestricted error correction model. The study concluded that in the short run a percentage point rise in the level of depreciation of the Ghana cedi leads to an increase in the rate of inflation by 0.2%. Additionally, the study indicated that a percentage point increase in the level of nominal interest rates will lower the result of inflation by 0.98%. In this case 1.67% inflation increases will occur at every percentage point increase in the nominal interest rate in the long run. However, the significant long-run relationship between exchange rate depreciation and inflation was not established.

Quartey and Afful-Mensah [34] reviewed recent monetary and financial policies pursued as well as the possible inter-relationships in Ghana. They posited that any effective monetary policy should be accompanied by fiscal discipline to ease monetary difficulties associated with huge budget deficits. Data on money supply, exchange rate, inflation and lending rates were compiled from Ghana Statistical Service and Bank of Ghana statistical bulletin from 1997 to 2012. They concluded that the key monetary indicators improved during the period of study. However, fiscal imbalance in the country has restricted these results.

Ahiabor [1]) focused mainly on the effect of monetary policy on inflation in Ghana. Variables such as interest rate, inflation, money supply and exchange rate were studied. The research adopted secondary data source from 1985 to 2009 and critically analyzed the variables quantitatively. Findings from the study confirmed a theoretically expected long-run positive correlation between inflation and money supply, an inverse relationship between inflation and interest rate as well as a positive relationship between inflation and exchange rate in Ghana.

Ngerebo [30] carried out a study on the effectiveness of monetary policy in controlling inflation in Nigeria. Using the Ordinary Least Square method, he analyzed the relationship between the following variables such as inflation, savings rate, monetary policy rate, prime lending rate, maximum lending rate, treasury bill rate, growth of narrow money supply, net domestic credit, growth of broad money supply, net credit to government and credit to private sector. Secondary data from 1985 to 2012 was collected from the statistical report of the Central Bank of Nigeria to conduct the study. The result of the analysis revealed that monetary policy rate, maximum lending rate, prime lending rate, net domestic credit and treasury bill rate are not statistically significant while growth of broad money supply, credit to private sector, growth of narrow money supply, savings rate, net credit to government are statistically significant in affecting inflation in Nigeria. The findings also indicate that some monetary policy instruments in Nigeria are effective in managing inflation while others are not.

Agoba et al. [4] on the other hand, observed the effect of central bank independence on the inflationary process in Africa while controlling for the effects of other drivers. To justify the persistence nature of inflation, the study included the lag of inflation. Furthermore, Hanson [22] using the hybrid new Keynesian Phillips curve and the generalized instrumental variable estimator included the lag of inflation to account for the extent of persistence in inflation in Ghana. Other previous studies used cointegration models. In the Ghanaian context, studies by Amoah and Aziakpono and Adom et al. [3, 7], justify how quickly shocks in inflation die off.

Finally, many other studies carried out mainly focus on studying the interactions of monetary policy on inflation and real GDP in different countries. However, little has been conducted in Ghana. This study seeks to analyze specifically how effective monetary policy has so far been able to control inflation in Ghana due to increased focus for Ghana to attain single digit inflation rate.

This study, on the basis of the reviewed literature, therefore tests the following null hypotheses:

In achieving the above research objectives, the following hypotheses are stipulated for testing:

H0: There is no significant relationship between interest rate and inflation rate in Ghana.

H1: There is significant relationship between interest rate and inflation rate in Ghana.

H0: There is no significant relationship between money supply and inflation rate in Ghana.

H1: There is significant relationship between money supply and inflation rate in Ghana.

H0: There is no significant relationship between T-bill rate and inflation rates in Ghana

H1: There is significant relationship between T-bill rate and inflation rates in Ghana.

H0: There is no significant relationship between monetary policy rate and inflation rates in Ghana.

H1: There is no significant relationship between monetary policy rate and inflation rates in Ghana.

3. Methods and Materials

This study employs a qualitative content analysis technique. it involves collecting and converting data into numerical form so that statistical calculations can be made and conclusions drawn. It was first used as a method for analysing newspaper and magazines, and has been recognized in history as a reliable research technique [25].

3.1. Sample Size and Sampling Technique

This research was based on the non – probability sampling technique where the sample size selection was based on the subjective judgement of the researcher rather than random selection.

The sample size was limited to a period of 11 years from 2006 to 2016. This sample was deemed adequate by the researcher because it covers the period in which inflation – targeting - the new monetary policy of the Bank of Ghana has been in operation.

3.2. Data Collection Method

The study makes use of only the secondary source of data gathering. The data used was from the records of Bank of Ghana, Ghana Statistical Service, and Institute for Scientific Social and Economic research (ISSER) internet, books and publications such as magazines, and journals among others. This is because the use of secondary data saves cost and time considering the period that has been given to complete this research.

3.3. Research Instrument

The major instruments used in collecting data for this research was the computer via surfing the internet. This was use to access the Bank of Ghana database, mainly for those data that were not found in other documents. Other information such as the annual abstract from the Ghana Statistical Service was also deemed necessary. It is also important to note that these data were considered to be reliable and valid for the study because of the sources from

which there were obtained.

3.4. Model Specification

In order to analyze the effectiveness of monetary policy in controlling inflation in Ghana, this study measures the effectiveness of the variables of the monetary policy rate in controlling the rate of inflation. The researcher uses as many reliable academically written papers and also from the records of Bank of Ghana, Ghana Statistical Service, and Institute for Scientific Social and Economic research (ISSER) as possible to make a coherent review of literature available to evaluate the effectiveness of the Monetary Policy regime adopted by Bank of Ghana in controlling inflation in the economy. The model adopted for this study is made up of the dependent and independent variables stated below as:

$$INF = f(Mpr, Tbr, Ir, Mss)$$

The monetary policy rate, T-bill rate, interest rate and Money supply make up the independent variables and inflation rate as the dependent variable. Ɛi represents all relevant variables that were omitted from the model as well as the random errors from the estimation process. The error term is assumed according to Ordinary Least Square (OLS) assumption to be distributed in zero mean and constant variance β0 whiles β1, β2, β3 and β4 are the elasticity parameters.

The above model can be written as a linear regression model:

$$Inf = \beta_0 + \beta_1 Mpr + \beta_2 Tbr + \beta_3 Ir + \beta_4 Mss + \varepsilon$$

3.5. Data Estimation Technique

The data collected were largely quantitative and hence quantitative analytical techniques were used in the data analysis. The data was presented using time series estimations and Pearson Correlation analysis to elaborate and establish the key determinants use in ensuring the effectiveness of the monetary Policy regime adopted by Bank of Ghana in controlling inflation. The regression outputs were obtained with the STATA version 14.

4. Results

In this section, findings of the study are presented. Table 1 show a summary of the correlational output of the dependent variable and the explanatory variables and correlational analysis on the data collected on each monetary economic indicator used as variable in this study from 2006 to 2016 in Ghana. It depicts the relationship between inflation and the other independent variables for the study period.

4.1. Descriptive Statistics

Table below provides a summary of the descriptive statistics of both endogenous and explanatory variables, included in the regression model. It demonstrates the average indicators of the variables used in this study. The mean values of the variables represent the average observations of the variable for the period 2006 to 2016, while the standard deviation represents the degree of dispersion of the observations for each of the variables. Overall, 132 data entry points was used for each variable.

Table 1. Summary of Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Inf	132	8.6545	3.8971	2.78	19.4
Mpr	132	16.936	4.1504	12.5	26.0
Tbr	132	18.173	6.4072	9.13	27.8
Ir	132	32.712	17.606	10.0	38.25
Mss	132	4.1500	0.3660	3.47	4.75

Stata Result 2020

From Table 1 above, the mean score for Inflation (Inf), which is the measure of the persistence increase in prices, and also the dependent variable is 8.6545 with minimum and maximum values of 2.78 and 19.4 respectively. The standard deviation of 3.8971 accounted for the variation between the minimum and maximum values noted earlier. The mean score of 8.6545 suggests that average inflation rate in the country is around 8.65% from 2006 to 2016.

The mean score for Treasury bill rate (Tbr), which is the rates at which the Government of Ghana borrow money from the public is 18.173 with minimum and maximum values of 9.13 and 27.8 respectively. The standard deviation of 6.4072 accounted for the variation between the minimum and maximum values noted earlier. The mean score of 18.173 suggests that the average T-bill rate in the country is around 18.17% between 2006 and 2016

The mean score for Interest rate (Ir), which is the proportion of the amount lent, deposited or borrowed is 32.71 with minimum and maximum values of 10.0 and 38.25 respectively. The standard deviation of 17.606 accounted for the variation between the minimum and maximum values noted earlier. The mean score of 32.71 suggests that the average interest rate in the country is around 32.71% between 2006 and 2016.

The mean score for monetary policy rate (Mpr) as measured by the rate at which the commercial banks can borrow from the central bank. Mpr registered a mean value of 4.15 with minimum and maximum values of 12.5 and 26.0 respectively. The standard deviation of 0.366 accounted for the variation between the minimum and maximum values observed. This means that the central bank of Ghana can lend to the central banks at an average of 4.15% and as high and low as 12.5% and 26.0% respective and this form the bases of banks' lending rate in Ghana.

The Money supply (Mss), recorded an average of 0.483 with minimum and maximum values of 3.47 and 4.75 respectively. This suggests that the standard deviation of 0.425 accounted for the variation between the minimum and maximum values noted earlier. The mean growth rate (measured as the growth in sales) was approximately 48%. This indicates that, the average total amount of money that has been in circulation in the country over the past 10 years is 4.15%.

4.2. Correlation Results

This correlational analysis is based on the data collected on each monetary economic indicator used as variable in this study from 2006 to 2016 in Ghana. It depicts the relationship between inflation and the other independent variables over the study period. The Table below shows the correlational output of the dependent variable and the explanatory variables. This is to address the first and second objective of this study.

Table 2. Explanatory Variables in Correlation Matrix.

	Inf	Mpr	Tbr	Ir	Mss
Inf	1.0000				
Mpr	0.1535	1.0000			
	*0.0790**				
Tbr	0.2440	0.6971	1.0000		
	*0.0048****	*0.0000****			
Ir	-0.0309	0.0049	0.0422	1.0000	
	0.7247	*0.9557*	*0.6308*		
Mss	-0.4462	0.6836	0.6169	0.0878	1.0000
	*0.0000****	*0.0000****	*0.0000****	*0.3168*	

Correlation significant levels. *** = 1%, ** = 5%, * = 10%.
Stata Result 2020

The output in the correlation matrix above in table, revealed that of the explanatory variables, Monetary policy Rate (Mpr), has a significant positive relationship with Inflation, Inf (r=0.1535, p=0.0790). The implication is that, monetary policy rate is highly significant in predicting Inflation (Inf). Regarding the relationship between Treasury Bill rate (Tbr) and Inflation, the study found that the rate of treasury bill, though positive also had a significant correlation with Inflation. (r=0.2440, p=0.0048). The implication is that, the rate of T-bill in Ghana is significant in determining the inflation levels in the country. Money supply was negative and significant with Inflation (r= -0.4462, p=0.0000). The implication here again is that, the amount of money in circulation in Ghana was significant in determining the inflation level in Ghana. However, Interest rate though negative was insignificant in determining the inflation rate in the country (r= -0.0309, p=0.7247).

Regression Analysis

$$Y = \beta_0 + \beta_1 X_1 + \cdots + \beta_n X_n + \varepsilon$$

$$Inf = \beta_0 + \beta_1 Mpr + \beta_2 Tbr + \beta_3 Ir + \beta_4 Mss + \varepsilon$$

The regression model is shown in equations above. The model is a statistical measure that attempts to determine the strength of the relationship or effect between one dependent variable (the endogenous variable), and a series of other changing variables (also known as the independent or exogenous variables).

4.3. Regression Diagnostics

Test for Multicollinearity (Variance Inflation Factor Approach)

Multicollinearity is an indication for a linear relationship between independent variables [19]. To test the existence or not-existence of multicollinearity problem, Variable Inflation Factor (VIF) technique was adopted. The variance inflation factor, VIF, is a measure of the reciprocal of the complement of the inter-correlation among the predictors: VIF=1/ (1- r2). where r2 is the multiple correlations between the predictor variable and other predictors. A decision rule for multicollinearity test of the model states a variable whose VIF values are greater than 10 indicate the possible existence of problem of multicollinearity.

Many researchers to check on the degree of co-linearity [19] use tolerance, defined as 1/VIF.

Table 3. Variance Inflation Factor Results.

Variable	VIF	1/VIF
Mpr	2.45	0.407742
Tbr	2.10	0.476766
Mss	2.05	0.488877
Ir	1.01	0.986008
Mean VIF	1.90	

Stata Result, 2020

From the above table, the result indicated that VIF value for all variables became less than the tolerable value thus; VIF values of all variables are less than 10 and the mean VIF is less than 2. It indicates that this model is free from multicollinearity and there is no problem of multicollinearity between the variables in this model.

4.4. Tests for Model Specification

Testing the model is very important to check out whether one or more relevant variables are omitted from the model or one or more irrelevant variables are included in the model. There are different methods to detect specification errors of the model. Ramsey RESET test for omitted variables are commonly used methods in the test.

Table 4. Ramsey RESET for Model Specification Test.

Ho: model has no omitted variables
F (3, 124) = 9.77
Prob > F = 0.1370

Stata Result, 2020

Ramsey RESET test for omitted variables (ovtest) was tested as depicted in table 4 above. It tests the null hypothesis that H0: model has no omitted variables. As a decision rule according to Ramsey RESET test, a model specification is fit for regression analysis if the p-value stated in P>F is greater than the chosen level significances i.e. 1%, 5% and 10%. Accordingly, this test indicates the model has no relevant omitted variables since the test failed to reject the null hypothesis, i.e., Prob.>F of 13.70% was found to be greater than any of the significance levels of the specified model of the study. Therefore, the model is correctly specified.

4.5. Regression Results

This regression analysis is based on the data collected on each monetary economic indicator used as variable in this study from 2006 to 2016 in Ghana. It depicts the effectiveness of the monetary Policy regime adopted by Bank of Ghana in controlling inflation over the study period. The Table below, shows the regression output of the dependent variable and the explanatory variables. This is to address the third objective of this study.

The effectiveness of the monetary Policy regime adopted by Bank of Ghana in controlling inflation (Dependent Variable: Inflation)

Table 5. Results of Regression Analysis.

Inf	Coef.	Robust Std. Err.	Z	P>|z|
Mpr	0.5262519	0.0621752	8.46	0.000
Tbr	0.358973	0.0445094	8.06	0.000
Ir	-0.0010332	0.0001158	-8.92	0.000
Mss	12.74849	0.7678962	16.60	0.000
_cons	46.09233	2.606054	17.69	0.000
F (4, 127) = 83.81	*Prob >chi2= 0.000*	*R-sqd = 0.7628*		*Num. of obs = 132*

Stata Result, 2020

Final Model

$$Inf = 46.09233 + 0.52625Mpr + 0.35897Tbr - 0.001033Ir + 12.74849Mss$$

In this model, the result in Table 5 clearly indicates that the predictive power of the model as measured by the R- Squared is 0.7628 or 76.28%. The result implies the independent variables explain about 76.28% of the variations in Inflation in Ghana from 2006 to 2016. In addition, the overall model is strongly significant at 1% level of confidence and this is shown by Prob> chi2 = 0.000.

The overall regression result showed that all independent variable is significant. The result also shows that all the coefficients in the model are different from zero, according to the F-Statistics, which is 83.81%. This implies that, 83.81% of the variance in the outcome and predictor variables is due to differences time series.

The empirical results from the model indicates that Monetary policy rate (Mpr), Treasury bill rate (Tbr) and Money supply (Mss) has a significant positive relationship with Inflation in the country whiles interest rate (Ir) has a negative significant relationship with Inflation. All the independent variable was significant at 0.001 or 1%.

This model can therefore be used in similar studies to estimate the effectiveness of the monetary Policy regime adopted by the central banks in other countries in controlling inflation.

The results of the pairwise correlation study show a significantly positive relationship between monetary policy rate and Inflation. This result is contrary with the findings of Ahiabor [1] whose study showed that there was a significantly inverse relationship between inflation and interest rate.

In addition, there was a significantly positive relationship between T-bill rate and Inflation. The regression table also depict a positive effect of T-bill rate on Inflation in Ghana. The findings were contrary to Ngerebo]30] who carried out a study on the effectiveness of monetary policy in controlling inflation in Nigeria and revealed that T-bill rate was not statistically significant. The findings also indicate that most monetary policy instruments in Ghana are effective in managing inflation while even with T-bill rate.

Moreover, there was a significantly positive relationship between Money supply and Inflation. The results are in line with the findings of Ahiabor [1] whose study had positive correlation between inflation and money supply in Ghana. Moreover, the regression table shows a significant positive effect on inflation. This is because as the money supply in the economy increases it will cause more money to be in the hands of people causing more money to chase fewer goods.

Furthermore, there was a negative but insignificant relationship between Interest rate and inflation. In addition to that, the regression table also showed a negative significant effect of interest rate on inflation. This was in support the work of Amarasekara and Gul et al [8, 17], who examined the impact of monetary policy on inflation and economic growth in Sri Lanka. It was found out that inflation reduces

immediately interest rates rise as a result of a contractionary reserve shock.

5. Findings and Recommendations

The findings of the study have been summarized in relation to how they fulfilled each of the hypothesis of the research and the implication of the results in the summary of findings below.

The result of the correlation analysis revealed that there was a negative but insignificant relationship between Interest rate and inflation. This implies that as interest rates increases, inflation rates will decrease but the strength of the relationship between the two variables is too weak to have a significant effect. In addition to that, the regression table also showed a negative significant effect of interest rate on inflation.

For the second hypothesis, it was found to be a significantly positive relationship between Money supply and Inflation. Likewise, the regression result shows a significant positive effect of money supply on inflation. This indicates that as the money supply in the economy increases it will cause more money to be in the hands of people causing more money to chase fewer goods.

There was also a significantly positive relationship between T-bill rate and Inflation and the regression table also depict a positive effect of T-bill rate on Inflation in Ghana. This finding indicates that most monetary policy instruments in Ghana are effective in managing inflation while even with T-bill rate.

In addition, the results of the pairwise correlation study show a significantly positive relationship between monetary policy rate and Inflation. This shows that as monetary policy rate increases, inflation also increases.

Finally, the study found monetary policy rate, t- bill rate, and money supply to be statistically significant relationship with inflation except interest rate, which was statistically insignificant. In respect to the effect of these independent variables on inflation, the study reveals that all the independent variable has a statistically significant effect on Inflation at 1% significant level.

The study was however, limited to only six variables, over an 11-year period (2006 to 2016). This limitation was due to the extreme difficulty in accessing data. Future research should consider expanding the scope of the study to include variables, to make the findings much more dependable. Future research should consider examining how GDP, Exchange rate and unemployment rate influence inflation in Ghana.

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