1.2 Statement of the Problem

Sudacevschi (2011) in her paper, Pros and Cons of Inflation Targeting Strategy, defines monetary policy as a process by which the government of a country or more commonly the monetary authority of a country controls:

1) The supply of money
2) Availability of money
3) Cost of money or rate of interest

This is aimed at attaining set objectives which are geared towards the growth and stability of the economy. Monetary policy plays a vital role in every country's economy and Inflation Targeting has become one of the leading frameworks for managing monetary policy. Inflation Targeting as a tool for conducting monetary policy has had a very short existence of less than 25 years, however some economies have shown positive signs after its adoption. The monetary authority of New Zealand for example has been able to contain price fluctuations and maintain price stability after the adoption of Inflation Targeting. The success of New Zealand in the stabilization of their price level persuaded other countries to adopt inflation targeting with Romania for example adopting Inflation Targeting in 2005. After its adoption, in 2005 with an inflation rate of about 8.9% Romania experienced single digit inflation, the first the country had experienced from 1990.

Ghana started using inflation targeting in 2002 and made the formal announcement of its use in 2007. The formal announcement brought the formal end to the use of monetary aggregates targeting as the main monetary policy regime which was introduced through the adoption of the Economic Recovery Program (ERP). The main reasons were to reduce the level and volatility of inflation, making it more manageable and also to increase the transparency in the whole monetary

policy process. This led to the formation of the Monetary Policy Committee whose main tool for controlling inflation is the policy rate. The common belief among economists and policymakers is that the implementation of inflation targeting has led to the decline in the rate of inflation in recent times, with Ghana attaining the elusive single digit inflation level within this period which was not attained under the monetary aggregates targeting policy.

The inflation data over the two periods (the monetary aggregates targeting period and the inflation targeting period) speak to a declining trend in the rate of inflation for the inflation targeting period. The inflation rate fell from an average of 31.85 percent between 1997 and 2001 to an average of 16.4 percent between 2002 and 2008 (Coleman, 2012) and further fell to an average of 11.9 between 2009 and 2013 (WDI, 2014).

While some people are not hesitant to attribute the declining inflation trend to the adoption of inflation targeting, others are of the view that policy had little to do with it and that it was coincidental (Amartey, 2014 & Some Members of Ghana's Parliament). Amartey (2014) argued that the fall may just be a coincidence since low inflation levels had gradually been achieved on a consistent basis prior to 2003. Assibey-Yeboah, a member of Ghana's parliament, also argues that in trying to fight inflation, the Bank of Ghana increases interest rates. This he says rather increases prices since the effects of the higher interest rates are passed on to consumers thereby defeating the main purpose of inflation targeting as a monetary policy. He also argues that this decreases aggregate demand and slows down growth.

This research therefore seeks to empirically find out whether inflation targeting as a monetary policy framework has had a positive impact on inflation and other macroeconomic variables such as economic growth, the exchange rate and the money supply. The other strand of the debate has also been that, inflation targeting has had a negative impact on the inflation rate, the Exchange

rate, the growth in money supply and especially on economic growth as argued by Assibey-Yeboah. To provide answers to some of these issues, we use Vector Auto-regression (VAR) technique to estimate the relationship among inflation, economic growth, exchange rate and growth in money supply over the period 1984-2013.

1.3 Objectives of the study

The general objective of this study is that we want to establish whether inflation targeting has had favourable impact on the rate of inflation in Ghana. Specifically, this study aims at:

- Evaluating the impact of Inflation Targeting on Ghana's inflation rate and inflation volatility
- Evaluating the impact of Inflation Targeting on Ghana's real GDP growth rates as well as real output volatility
- Assessing the impact of Inflation Targeting on Ghana's Exchange rate
- Evaluating the impact of Inflation Targeting on Ghana's growth in money supply over the years

1.4 Research Questions

The research questions that emanate from the research problem are:

- Has Inflation Targeting improved the inflation situation in Ghana? Has the inflation rate been lowered and is it more stable?
- Has the adoption of Inflation Targeting improved real GDP growth of Ghana? Has it fallen or has it increased over the years?

- What has been the impact of Inflation Targeting on Ghana's Exchange rate since its adoption?
- What has been the effect of adopting Inflation Targeting on the growth in Money Supply in Ghana?

1.5 Justification of the study

Over 10 years after the informal adoption of Inflation Targeting by the Bank of Ghana, not much research has been done to ascertain its effectiveness in stabilizing prices. However, many policy makers keep asking whether Inflation Targeting is the best policy strategy for Ghana. The Bank of Ghana has however defended the adoption of Inflation Targeting as the best policy strategy to tackle Ghana's chronic inflation problem. This is however not surprising as the Bank of Ghana is the custodian of the policy. Given the above argument, the only way to ascertain scientifically the effects of Inflation Targeting on the inflation rates and the other selected macro-economic variables is to conduct a research. In addition, most research conducted on Inflation Targeting has been concentrated on the developed nations. Those that have looked at developing nations have concentrated their research on Latin American countries with little done on Africa. In Ghana, works have been done by Coleman (2012), Puni et al. (2014) and Ayisi (2013), however, these studies have been limited to the effects of inflation targeting on inflation, economic growth and the interest rate. This work differs from what has already been done in Ghana through the addition of the exchange rate and the growth in money supply to the inflation rate and the growth rate. This work also employs a longer period for the post inflation targeting era as compared to the other works done in Ghana.

Research on the effects of Inflation Targeting on inflation rates and the other selected macro-economic variables will therefore help to bridge the gap between work done on developed countries and that done on developing countries especially African countries. This work will therefore add to and hopefully play an important role to the existing knowledge on Inflation Targeting in Africa.

1.6 Scope of the study

The research covers the economy as a whole. Due to the nature of the study it is not limited to any specific sectors but takes the whole economy of Ghana into consideration. It studies the inflation rate of the country, the real economic growth rate of the economy, the Exchange rate as well as the growth in money supply of the country.

1.7 Organization of the Chapters

The research is organized into five main chapters. Chapter one dealt with the introduction to the thesis which included a background to the study, the objectives of the study and the research questions. The chapter also included the statement of the problem and the relevance of the study.

Chapter two contains the review of the relevant works that have appeared in the literature. It is divided into two parts, the theoretical review as well as the empirical review. The theoretical aspect looks at theories that have been developed on inflation targeting. The empirical part looks at works that have been done as far as inflation targeting and its impact on macroeconomic variables in selected countries.

Chapter three deals with the review of inflation and monetary policy in Ghana. Under it, we discuss the history of inflation in Ghana over the years, the causes of inflation in Ghana and how inflation is measured in Ghana. The part on monetary policy looks at the controls that were in use before reforms took place within the financial system and what is in use now. The work done by the monetary policy committee, which is responsible for monetary policy in Ghana, is also discussed. Inflation targeting as a monetary policy framework in Ghana is also looked at.

Chapter four is divided into two parts. The first part discusses the methodology of the study; the sources and type of data that will be used, the years that will be covered and the models that will be used in estimation. The second part deals with the analysis of the data. Here the model is estimated and the effects of inflation targeting on the selected macroeconomic variables determined.

Chapter five is also divided into two parts. The first part contains the conclusion and summary of the work. The second part deals with policy recommendations and the best way forward. Conclusions are drawn and recommendations made based on the results from the analysis.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is divided into two parts, the first part contains the theoretical review of theoretical literature on the inflation targeting framework, the requirements for the adoption of the framework and the premises for its adoption. The second part deals with empirical literature on inflation targeting and its impact on selected macroeconomic variables.

2.2 What is Inflation Targeting?

Bernanke et al. (1999) define inflation targeting as "a framework for monetary policy characterized by the public announcement of official quantitative targets or target ranges for the inflation rate over one or more time horizons and by the explicit acknowledgement that low, stable inflation is monetary policy's primary long run goal''.

Mishkin (2007) argues that inflation targeting involves 5 main elements, and these are;

"1) Public announcement of medium-term numerical targets for inflation

2) An institutional commitment to price stability as the primary long run goal of monetary policy and a commitment to achieve the inflation goal

3) An information-inclusive strategy in which many variables and not just monetary aggregates are used in making decisions about monetary policy

4) Increased transparency of the monetary policy strategy through communication with the public and the market about the plans and objectives of monetary policy makers

5) Increased accountability of the central bank for attaining its inflation objectives."

Inflation targeting as a monetary policy strategy has advantages over other monetary policy strategies, in that, inflation targeting is easily understood by the general public due to the periodic communication between the monetary authorities and the general public. Inflation Targeting to a large extent increases the credibility and accountability of the monetary authorities. It also helps the monetary authorities concentrate more on the domestic shocks and hence the domestic economy as opposed to a monetary aggregates strategy.

The first country to formally adopt inflation targeting was New Zealand in 1990. Since then countries such as Canada in 1991, the UK in 1992 and Sweden in 1993 have adopted it. In Africa, South Africa was the first country to adopt Inflation Targeting whiles Ghana was the second. The Bank of Ghana adopted inflation targeting in 2002 but made a formal announcement of its use in May 2007. Ghana adopted inflation targeting as part of its efforts in preventing the slump of the economy which was necessary due to the unstable and unsustainable inflation levels. Inflation went as high as about 117% in 1981 and about 123% in 1983 (Gyebi and Boafo, 2013).

Over time, most countries have moved to adopt inflation targeting for the conduct of monetary policy. Under inflation targeting, the central bank releases a targeted rate of inflation. The central bank then tries to move actual inflation towards the target mostly through the use of interest rate. Inflation Targeting gives the monetary authority direct control of the likely path of inflation by reducing the role of intermediary guidelines. Inflation targeting relies on targeting inflation using an inflation forecast. The monetary authority will forecast the future path of inflation and then use

monetary policy to deal with any deviations that may occur between the forecasted inflation rate and the actual inflation rate. The size of the deviation will determine the adjustment that has to be made to monetary policy. To be able to determine the path that inflation may likely take, the monetary authority has to take a thorough look at factors that may have affected inflation in the past. Inflation targeting takes into account many macroeconomic variables in its forecasting not just the money supply which occurs in monetary aggregates targeting.

2.3 Regimes of Inflation Targeting

There are basically three inflation targeting regimes which are classified according to the central bank's credibility and clarity when it comes to its commitment to the set inflation target. Clarity is measured by the announcements of set inflation targets to the general public as well as institutional frameworks put in place to support accountability to the set target. The market ratings of long term local currency government debt and the actual inflation outturn are used as proxies to measure the level of credibility within an economy (Carare and Stone, 2003). These three regimes are:

1. Full-fledged Inflation Targeting (FFIT)
2. Eclectic Inflation Targeting (EIT)
3. Inflation Targeting Lite (ITL)

2.3.1 Full Fledged Inflation Targeting

Full-fledged Inflation Targeting is a regime of inflation targeting where the Central Bank of a country makes a full commitment to the target and is totally accountable for the inflation target (Carare and Stone, 2003). The Full-fledged inflation targeting regime is the best known form.

Countries using this form of inflation targeting have their credibility levels falling between medium and high and as such show a clear commitment to this framework through the institutionalization of transparent monetary frameworks which hold the central bank accountable for its actions. One major advantage of the full-fledged inflation targeting regime is its ability to improve on the central banks time inconsistency problem which may often lead to higher inflation levels if not checked. New Zealand was the first country to adopt the full-fledged inflation targeting regime and since then, countries such as Norway, Poland, Australia, Canada and the United Kingdom have also adopted this regime.

2.3.2 Eclectic Inflation Targeting

Eclectic Inflation Targeting is a regime of Inflation Targeting where the central Bank of a country does not state an explicit target and no intermediate targets are used (Gerlach, 1999). Countries that practice eclectic inflation targeting are seen as having very high credibility so much that they can achieve and maintain low levels of inflation without necessarily being fully transparent or accountable when it comes to a set inflation target. Their past experiences of achieving and maintaining low levels of inflation and their high levels of financial stability gives them the ability to pursue both output and price stabilization. Very few central banks fall within this category. The United States is one such country. Other central banks seen to be practicing this regime of inflation targeting are the central banks of Denmark and Switzerland.

2.3.3 Inflation Targeting Lite

Stone (2002) defines inflation targeting lite regimes as ones where the central bank "announces a broad inflation objective but owing to its relative low credibility it is not able to maintain inflation as the foremost policy objective." Inflation targeting Lite (ITL) countries give out broad inflation objectives. These countries have low levels of credibility owing to the fact that they are susceptible to large economic shocks and are usually financially unstable and lack the requisite institutional frameworks. Because of their low levels of credibility, these countries cannot maintain inflation as their foremost objective when it comes to policy. This regime is seen as a transitional one. Many countries fall within this category, most of them emerging economies. Some central banks seen to be practising Inflation Targeting Lite are the central banks of Albania, Croatia, Guatemala and Mauritius (Stone, 2003).

2.4 Requirements for The Adoption of Inflation Targeting

To be able to conduct inflation targeting effectively, the central bank should have some level of independence in its conduct of monetary policy. Central banks cannot be said to be totally independent from governmental influence, but they should have the freedom to choose which instruments to use in achieving set inflation rates. For this, a country should not have fiscal dominance; the country's fiscal policy should not dictate the monetary policy. This also implies that government borrowing from the central bank should be minimal or non-existent. The financial system in these countries should be deep enough to absorb enough of the public debt such as treasury bills. This also means that the government should have a wide revenue base and should not rely a lot on funds from seigniorage (Osuji and Akujuobi, 2012). If there is the presence of

fiscal dominance, monetary policy may be undermined in that the government will expect the central bank to support it in its fiscal policy activities. This is probably the reason most countries have not adopted inflation targeting.

Another requirement to achieving success with inflation targeting is the activity of the monetary authorities not to target any other economic variables such as the exchange rate or employment. A country that chooses to achieve a certain level of employment which may help its citizens, may find it difficult in achieving successful inflation targeting. In such a case, the monetary authority will subordinate its monetary policy to achieving increased employment in the country. This may lead to the monetary authorities losing credibility since there will be no assurances that the inflation targeting system enjoys precedence over achieving a certain level of employment or whether achieving a given level of employment enjoys precedence over the inflation targeting framework. The inflation targeting framework will therefore lose a major ingredient needed for its success due to the loss in credibility by the monetary authority.

Theoretically if a country achieves these two conditions, it can practise a monetary policy based on inflation targeting. However in practice some other steps need to be taken. According to (Debelle et al., 1998) these are:

1) The monetary authorities have to state clearly these quantitative targets for future inflation.
2) The monetary authorities have to clearly state to the general public that hitting the set inflation target takes precedence over all other monetary policy objectives.
3) The monetary authorities need to create a model for forecasting inflation which uses information on future inflation.

4) The monetary authorities need a procedure which is forward- looking in which instruments of monetary policy can be adjusted to hit a chosen target

2.5 Premises for the Conduct of Inflation Targeting

The basic premise for the conduct of inflation targeting is that the primary goal of any country's monetary policy should be to attain and sustain low and stable inflation rate. According to Masson et al. (1997) there however exists other premises around which inflation targeting is conducted. These are:

1) An increase in the money supply is neutral in the medium to long run, that is, a monetary expansion has lasting effects only on the price level, not on output or unemployment.
2) Inflation is costly, either in terms of resource allocation (efficiency costs) or in terms of long run output growth or both.
3) Money is not neutral in the shortrun, that is, monetary policy has important transitory effect on a number of real variables such as output and unemployment. There is however, at best an imperfect understanding of the nature and/or size of these effects of the horizon over which they manifest themselves and of the mechanisms through which monetary impulses are transmitted to the rest of the economy.
4) Monetary policy affects the rate of inflation with lags of uncertain duration and with variable strength, which undermine the central bank's ability to control inflation on a period by period basis.

From these premises many see inflation targeting as a framework which can improve the implementation, design and performance of a country's monetary policy better than other frameworks used by other central banks.

2.6 The Best Level of Inflation to be Targeted

Usually there is a bit of divergence here between theory and practice. In the Keynesian theory, an inflation rate of zero is the optimal while the Friedman rule suggests a negative inflation rate, however central banks always have a positive target which is explained by Hammond (2012) as;

1) Measured inflation tends to overstate actual inflation by around 0.5 percentage points, so a margin above zero is required to compensate for this differential.
2) Positive inflation target decreases the probability of hitting the zero lower bound on nominal rates, a point that had operational importance in the global economic slowdown experienced in 2008 to 2009.

Most central banks in industrialized nations over the years have resorted to a positive inflation rate of around 3-4 percent. Though inflation imposes a cost on welfare, the gains which may be made through reducing inflation to below 2 percent may not outweigh the advantages which will be derived from a positive inflation rate. There is however no fixed optimal inflation level for developing countries but it is believed through Balassa Samuelson effects that their optimal levels may be a bit higher than what is in the industrialized nations (Hammond, 2012).

History has shown that the growth in productivity in the traded goods sector has grown faster than that for the non-traded goods sector (Mihaljek, 2002). From the law of one price, tradable goods tend to have equalized prices across countries while that for non-tradable goods do not. The higher productivity experienced in the tradable goods sector increases wages in that sector. With the mobility of labour, people will move across sectors until there is an increase in the wages in the entire economy. Those who produce non-tradable goods will not be able to pay the higher wages unless the prices in the non-tradable goods sector increase (Mihaljek, 2002).

Faria and Leon-Ledesma (2005) argue that the price difference for the tradable-non-tradable sectors is lower for the rich countries than for the poor ones. They also argue that if the tradable goods sector has its productivity growing faster compared to non-tradable goods in a particular country relative to others, that particular country will experience an increase in its real exchange rate. Holding other things constant, this will lead to lower inflation levels for developed countries relative to less developed ones through the negative relationship between the exchange rate and inflation. Developing countries are therefore expected through the Balassa Samuelson effects to have optimal inflation levels that are higher than that for the developed countries.

2.7 The Target Horizon

The target horizon will usually depend on whether the inflation rate is within the range of price stability. Most countries that have targeted inflation of 3 percent or lower usually have medium term target horizons. The advantage of medium term targets is that they are able to anchor inflation expectations and are able to allow divergence from the set target within the short run assuming the

economy is hit by a shock (Hammond, 2012). The target horizon can also be looked at from how long it will take the transmission mechanism to achieve its goal of affecting monetary policy. If it takes a long time for the transmission mechanism to achieve its goal, it becomes almost impossible to influence the rate of inflation within the short run. Developing markets will usually go in for policy horizons which are shorter since their policy to inflation pass-through is quicker.

2.8 The Target Measure

The CPI is the preferred operational target used by inflation targeting countries as opposed to the others such as the GDP deflator. The headline measure is also preferred to the core measure. The core measure is less volatile and so it is believed to respond more favorably to the policy rate, however, the headline measure is what the general public is familiar with.

Most measures which involve core inflation leave out food as a component in the basket of goods, however this is a very important component especially in developing countries and so using the core measure which does not contain the food component may cause the measure of inflation to lose credibility. Some central banks such as the Australian, Canadian and the Hungarian also publish forecasts of core inflation in addition to the headline measure. The interpretation of the core measure should however be done with some caution as evident from the 2007 shocks to food and oil prices. This led to the movement of household incomes from other goods and services to food and utilities. Income to be spent on other goods and services had therefore fallen and so created the idea that prices of those goods and services were stable without looking at the whole picture.

Using the core measure of inflation at this point will give a misleading interpretation of what is actually happening within the economy.

2.9 A Point or Range Target

Monetary authorities that use range targets have adopted it because of the uncertainty surrounding the prediction and control of inflation. One indication this gives to the general public is that inflation cannot be controlled perfectly and reduces their expectations that monetary policy can be used to control it with very high precision. The size of the range may depend on the uncertainties the central bank has about the effects of its policies. A wider range may therefore give a signal that there is a high level of uncertainty while a smaller range gives the indication that there is only a low level of uncertainty. A range target may be preferred to a point target in periods of uncertainty for credibility. A point target may harm the credibility of a central bank if there is a deviation over short periods while there is a higher chance that the range target may be met.

A range target may give the central bank room to pursue other targets apart from price stability assuming it has multiple objectives. A range target may also be preferable if a country's optimal inflation level varies gradually over time.

Bernanke et al. (2005) however argue that missing a range target may be seen by the general public as more serious than missing a point target. The range will however make the general public concentrate on whether the inflation rate is within the range or outside instead of looking at how much it has deviated or moved from the mid-point. This puts a lot of pressure on the central bank to keep inflation within the range causing volatility within the economy especially with a short

horizon. In such a case, there needs to be a trade off between the size of the range used and the horizon length that is used.

The point target has superior signaling properties compared to that of the range target. A point target becomes easier to communicate to the general public and gives a single focal point around which expectations could be formed. According to Hammond (2012) point targets are very precise and so send a strong signal to the market of the central banks intentions. With a point target, the market gets the feeling that the central bank has a high level of certainty regarding hitting that set target. In a case where the central bank does hit the target consistently for some period, it increases the credibility of the process.

Many central banks have however adopted a mixture of the two, that is, they express a point target but with a tolerance band. Only a few central banks such as the Swedish, the Hungarian and the Norwegian central banks use a simple point target while few others also use a simple range target.

2.10 Review of Empirical Works on Inflation Targeting

2.10.1 Inflation Targeting and Inflation Rates

In Hu's 2003 work on inflation targeting, he used a dataset containing 66 countries covering a period from 1980 to 2000. Twenty two of the countries were inflation targeting countries while 44 were seen as potential inflation targeting countries. To study the effects of inflation targeting better, the dataset was further processed. Because it is difficult to study the performance of a country that has just implemented inflation targeting, only countries which have had 4 years of experience with inflation targeting as at the end of 2000 were kept in the dataset. Fourteen

countries were therefore dropped from the dataset. Countries with very high inflation were also eliminated because Hu believed such countries would distort the empirical results. Countries with average inflation rates higher than 50 percent between 1985 to 2000 were taken out.

As a result of this 15 non inflation targeting countries were taken out. In total 37 countries were left after the processing of the initial dataset with 8 of them being inflation targeting countries and 29 of them non inflation targeting countries. For the 8 inflation targeting countries, the standard deviation and the average of inflation were computed from 1985 until a year before the adoption of inflation targeting in that country and the year they adopted inflation targeting until the year 2000. Descriptive statistics tell us there is an improvement in inflation for both the inflation targeting countries and the non inflation targeting countries. Each inflation targeting country has a decline in inflation rate as well as inflation variability. With average inflation rate and inflation variability falling from 8.3 to3.1 percent and 3.5 to 2.1 percent respectively.

A pattern similar to the inflation targeting countries is found for the non inflation targeting group with inflation rate and inflation variability falling from 7.5 to 4.7 percent and 2.7 to 1.8 percent respectively. The rate of inflation and inflation variability are done for industrial countries. It was found that inflation rates and variability dropped from 6.4 to 2.1 percent and 2.3 to 1.5 percent respectively for inflation targeting and from 4.7 to 2.2 percent and from 1.9 to 1.1 percent respectively for non targeting countries. It becomes difficult to assess the true effect of inflation targeting as the inflation rate and inflation variability fall for both the targeting and non targeting countries.

The main difference here is that the inflation rate for inflation targeting countries falls from a level higher than that for the non targeting countries to a level lower than that for the non targeting countries. This he explains, suggests that with inflation targeting, countries which are not

performing strongly may converge to those that are doing better. He run a regression using 51 of the countries in the dataset and finds that inflation targeting significantly lowers inflation and the size of this reduction is large. On the impact on inflation variability, inflation targeting influences inflation variability favorably however this is not significant. In summary he concludes that inflation targeting improves the inflation performance of both targeting countries and non-targeting countries. He however suggests that more work needs to be done.

Genc et al. (2007) conducted a research to find out whether in the case of Canada, New Zealand, Sweden and the United Kingdom inflation has been reduced by inflation targeting. They did this by comparing the forecasted inflation levels based on pre-inflation targeting levels with actual inflation levels after the acceptance of inflation targeting. They chose not to add emerging economies because of their economic volatility to shocks. They used data on consumer price indexes on the countries involved. The data was sourced from the IMF International Financial Statistics (IFS) database. The data covered the period from 1960 to 2004 and was divided into two subperiods. The first subperiod was the period before the implementation of inflation targeting while the second subperiod was the period after the implementation of inflation targeting. In the pre-inflation targeting period a statistically acceptable model of inflation is estimated for each country. The estimation is used to forecast for the post-inflation targeting period which gives inflation levels that may have been expected assuming inflation targeting had not been adopted.

The success of inflation targeting was achieved through comparing the inflation levels obtained in the pre-inflation targeting era to the forecasts which were obtained from the model. If the inflation levels from the forecasts are found to be statistically significant above the level of the actual inflation, the inflation targeting could then be said to have been successful in bringing down

inflation in that particular country. The results obtained showed that their models had predicted higher levels of inflation than had been attained in the post-inflation targeting era. All the countries except New Zealand had their actual inflation levels and their forecasted inflation levels statistically non distinguishable at the 95 percent confidence level. That for New Zealand had the forecast inflation levels statistically higher than the actual inflation level after 1995. They concluded that though there seemed to be lower inflation levels after the adoption of inflation targeting, this could not be proved statistically. They supported their work with Honda (2000) who had the same results for New Zealand, Canada and the United Kingdom.

In Lin and Ye's (2007) work, they looked at whether inflation targeting has any impact on the inflation rate and inflation variability within seven industrial countries. The data used included 22 industrial nations looked at within the periods 1985 to 1999. A total of 321 observations were used with the data coming from the International Monetary Fund's World Economic Outlook and International Financial Statistics. Their objective was to look at the treatment effect of inflation targeting on the various nations that were targeting inflation and so they had to estimate the average treatment effect on the treated (ATT). The problem however with this method is that there would be bias estimates if the targeting decision is not random. In this case there would be a "selection on observables" problem if a set of observable variables that affect the outcomes are systematically correlated with the targeting choice.

The work therefore employed propensity matching methods to solve this problem. The results from the treatment effects of inflation targeting on inflation level where the level of inflation is defined as the annual growth rate in the consumer price index (CPI) and the inflation variability is defined as a standard deviation of a three year moving average of inflation considered for the seven

inflation targeting countries showed a downward movement in inflation levels and inflation variability. This without further investigation will lead one to think that inflation targeting leads to a lowering of both the inflation level and inflation variability. After applying the matching method, the ATT's were found to be quantitatively small and insignificant statistically. This suggests that inflation targeting does not have a statistically significant impact on inflation or inflation variability.

In his research on Ghana, Coleman (2012) used monthly time series data to analyse the effect of Inflation targeting on inflation. Two periods were considered in his work, the pre and the post inflation targeting periods. The pre inflation targeting period was between 1990 and 2001 while the post inflation targeting period was between 2002 and 2008. The data was sourced from the Bank of Ghana and the Ghana Statistical Service. Coleman used a model by Petursson (2004) which he simplified for his work. He used an Autoregressive model of the first order (AR1 model) and used inflation targeting and other macroeconomic variables as exogenous variables. Coleman specified inflation as a function of its first lag and used a dummy to represent inflation targeting and added a control for external shocks. He used a regression based on Newey-West standard errors because he assumed the error term to be heteroskedastic and also may be correlated and so using ordinary least squares will give inefficient estimates. The results obtained showed a variation in inflation over the two periods. Volatility of inflation was also found to have declined significantly over the two periods with the standard deviation falling from 15.6 to 5.2.

Coleman had a negative coefficient for inflation targeting meaning that there had been a reduction in inflation series over the years. He believed that inflation targeting was this successful because it anchored expectations using consistency and credibility in its conduct of monetary policy and

so this increased the understanding when it came to inflation targeting. Coleman also found that exogenous shocks within the economy died out faster in the inflation targeting regime compared to the pre inflation targeting era. He also argued that because inflation targeting improved the credibility of monetary policy and the anchoring of inflation expectations, there was a reduction in the response of inflation to economic shocks and therefore reducing the pass-through effect.

Puni et al. (2014) conducted a quantitative causal research on inflation targeting and inflation on Ghana. Secondary data was used in their analysis and the source of their data was the Bank of Ghana. Data was collected on inflation rates from 2000 to 2007 which represented their pre inflation targeting era while data from 2007 to 2013 represented their post inflation targeting era. Puni et al. considered the official date for the announcement of inflation targeting in Ghana in their analysis and so their pre inflation targeting era covered a period of seven years while their post inflation targeting era also covered a period of seven years. Analysis of the data was done using the test of mean differences and regression analysis.

The t-test was used to find the mean differences of inflation between the two periods under consideration. A 5 percent significance level was used in assessing the results. The results showed that there was a difference between mean inflation rates of the two periods under consideration at the 5 percent significance level. They supported their answer with actual inflation figures which showed a decline in inflation over the period. They thus concluded that taking the period under consideration and data used, inflation targeting has had a negative relationship with the rate of inflation in that inflation targeting reduces the inflation rate in Ghana. They argued that though the rate of inflation did not reduce to the levels seen as theoretically optimal, that is between 0 and 2 percent, the reduction was still statistically significant.

2.10.2 Inflation Targeting and Growth

Abo-Zaid and Tuzemen (2008) conducted a research on inflation targeting and economic growth. The study covered 23 countries out of which 11 are developed countries and 12 are developing countries. They created two control groups to make comparisons easier, one for developed and the other for developing countries. The control groups were made up of 17 developing and 10 developed non-inflation targeting countries. The period used for the analysis covered the years 1980 to 2007. They adopted the work of Ball and Sheridan (2005) and Goncalves and Salles (2008) in choosing the starting period for the non-inflation targeting countries. They decided to use the average year that inflation targeting was adopted for the corresponding inflation targeting countries thus 1995 and 1998 were chosen as the adoption years for the developed and developing countries respectively. The data used was sourced from the IMF's World Economic Outlook database. This however did not contain fiscal data for developing countries and so the data was supplemented with data from other sources such as the database used in Kaminsky, Reinhart and Vegh (2004) which had data on fiscal imbalances and fiscal data was also available on the websites of the OECD and the various central banks.

They argue that according to some works conducted, inflation targeting is believed to have a negative impact on growth since central banks adopt tightening policy measures to help control inflation, however their aim was to challenge this claim. With the exception of Columbia and Thailand, the average GDP growth rate for developing inflation targeting nations was higher in the post inflation targeting period compared to the pre inflation targeting period. The cross country average rose by about 2 percent an increase from 2.5 percent to 4.2 percent. Some of the countries had an upward trend in GDP growth rates immediately after they adopted inflation targeting. The increase in the average GDP growth for the developing non inflation targeting countries was lower,

an increase from 3.5 percent to 4.3 percent for the pre and post inflation targeting periods respectively.

The GDP growth volatility was lower for the inflation targeting countries compared to the non targeting countries. For the developed countries, the average growth rate increased from 2.8 percent to 3.1 percent for the pre and post inflation targeting periods respectively. For the developed non targeting countries, GDP growth rate reduced from 2.4 percent to 2.1 percent for the pre and post inflation targeting periods respectively. The results also showed that there was a decline in the volatilities of growth rate for both the developed inflation targeting countries and the non targeting countries. Growth rate was however more volatile in the inflation targeting countries compared to the non inflation targeting countries. This they argue is due to the fact that the inflation targeting countries experienced high levels of inflation before the adoption of inflation targeting. They conclude that there is no evidence of a negative effect of inflation targeting on GDP growth rate, the reverse is however the case. There is an increase in the GDP growth rates and a fall in GDP volatilities especially in the developing inflation targeting countries.

Garcia –Solanes and Torrejon-Flores (2009) conducted a research on inflation targeting. They tried to find the effects of the adoption of inflation targeting on five Latin American countries. These countries are Brazil, Chile, Columbia, Mexico and Peru. First, they compared the results of pre to post inflation targeting for each country. Then they compared the results from the inflation targeting countries to those of non-targeting countries. Thirteen non inflation targeting countries were selected for the study. For growth, they used annualized and quarterly observations from 1981 to 2007. The start date that was used for the inflation targeting countries was the moment their central banks started publishing inflation reports. Using descriptive statistics, they found that

there had been an increase in growth with only Mexico showing a decrease. There was also a reduction in the volatility of growth with only Columbia and Mexico not showing signs of a reduction.

To get a clearer picture, they compared the performance of the inflation targeting countries to that of the non targeting countries. They found out that countries that had adopted inflation targeting had higher GDP growth rates and lower GDP variability compared to the non targeting countries. They then conducted regression analysis to see whether it supported the results they obtained from the descriptive statistics. They found out that the effects of inflation targeting on growth was generally positive, especially when it came to the reduction in growth variability. Some exceptions were however found. GDP growth had decreased in Mexico while that for Chile was not significant. Growth variability decreased in three of the countries but that for Mexico and Brazil were not statistically significant.

In his research Libanio (2010) analysed the relationship between monetary policy and economic growth in use in Brazil between 1999 to 2006 using monthly data. Inflation targeting was the monetary policy in use within this period. He wanted to find the effects of inflation targeting on growth through its influence on aggregate demand. He was trying to prove whether the argument that the manner in which inflation targeting was conducted in Brazil led to an upward movement in interest rate which was harmful to aggregate demand and as a result affected economic growth negatively.

He analysed the procyclical nature of monetary policy under inflation targeting through the estimation of the connection between interest rates and economic activity. Because interest rates

are expected to have an influence on economic activity, the study uses the vector autoregression (VAR) model to capture the feedback effects. Two dummy variables were created; i) GOOD and ii) BAD. Good has a value of 1 in periods where GDP is above a given linear trend and 0 otherwise. BAD was assumed to be symmetrical to good. He multiplied the dummy variables he created by the rates of growth to create two different series which were "good times" and "bad times" these two equations were then estimated. A proxy was used for GDP and this was the seasonally adjusted industrial production index. He also calculated real interest rates using annualized selic rates from the then Brazilian central bank which had been deflated by the consumer price index IPCA.

The results from the estimation showed a negative coefficient for GDP growth which showed that inflation targeting had been procyclical in Brazil in both "good times" and "bad times". He concluded that inflation targeting in Brazil may cause an upward movement in interest rates which may negatively affect aggregate demand thereby affecting ouput growth negatively.

Carrasco and Ferreiro (2011) in their research on inflation targeting tried to find out whether full-fledged inflation targeting has had an impact on the variability and growth rate of output in Mexico. In theory it is believed that inflation targeting improved macroeconomic performance in a country. Inflation targeting stabilizes inflation rates and this is believed to lead to the stability in output thereby reducing output volatility. They therefore wanted to test whether the improvement in inflation after the adoption of inflation targeting in mexico has increased the economic growth or reduced the volatility in growth rates.

To analyze whether inflation targeting has had an effect on economic growth, they analyzed the economic growth of Mexico for the years 1981 to 2007 by using statistical tests to test for the

equality of means and variances. The total period of the study is divided into three subperiods with the first subperiod being from 1981 to 1990, the second subperiod is from 1991 to 1998 and the third subperiod is from 1999 to 2007 which corresponds to the adoption of inflation targeting in Mexico. Results showed that the volatility in output was lower in the third subperiod compared to the others and so they argued that the fall in inflation or the implementation of inflation targeting has lowered the volatility in output. Using the equality of means it was found out that there was no increase in growth rates in Mexico after the implementation of inflation targeting.

Ayisi (2013) conducted a research on whether a single digit inflation has any positive effect on economic growth and whether inflation targeting has an effect on economic growth in Ghana. He used annual time series data which covered 1965 to 2011 for Ghana. He estimated a growth inflation relationship to find the effects of inflation on economic growth. He explained the relationship using Keynesian aggregate demand and aggregate supply framework. His study used the autoregressive distributed lag (ARDL) model which was developed by Persaran in estimating his model. He used the ARDL technique because of its flexibility when it comes to variables with different order of integration. It also makes it easy to derive a dynamic error correction model using a linear transformation from the ARDL. This technique also avoids problems which may come out as a result of using non stationary time series data. He conducted a unit root test for his series using Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests.

The ADF showed that almost all the series were stationary at I(1) while the KPSS showed that all the series were stationary at levels. Because of the conflicting results from the ADL and the KPSS, he tested for co integration so as to avoid any spurious results. Using the error correction test of co

integration, the study found out that the models were statistically significant at 1 percent signaling that the series was co integrated. Therefore inferences could be made. He found that single digit inflation whether in the shortrun or longrun had no significant relationship on GDP. The implication is that pursuing a single digit inflation by the central bank will have no effect on the GDP of Ghana. He however found out that there was a significant relationship between inflation targeting and economic growth at the 1 percent significance level. Meaning pursuing inflation targeting in Ghana will lead to a positive impact on economic growth in the shortrun and longrun.

2.10.3 Inflation Targeting and the Exchange Rate

In Petursson's (2004) work, he tried to find if any relationship exists between inflation targeting and the exchange rate volatility. He argues that there is an increase in the fluctuations of the exchange rate after the adoption of inflation targeting as more emphasis is placed on trying to stabilize the domestic value of a currency at the expense of its external value. He used quarterly data ranging from the first quarter of 1981 to the fourth quarter of 2002 except for the Czech Republic which has its data starting from the fourth quarter of 1990. The data was sourced from the International Monetary Fund except that for Iceland which was obtained from their central bank and that for Brazil, Peru and Thailand were obtained from JP Morgan. A total of 21 inflation targeting nations were used. The fluctuations in real exchange rates were compared for the pre and post inflation targeting periods.

He argues that from the results, on average the real exchange rate seems to have fallen looking at all the inflation targeting countries. However he argues that the real exchange rate seems to have increased on average in the industrial countries. Taking the individual countries, the results show

that the fluctuations in the exchange rate has increased for ten countries and fallen in eleven of them. He also argues that inflation targeting does not necessarily lead to an increase or decrease in exchange rate volatility. He based his argument on the fact that the countries that had a fixed exchange rate regime prior to the adoption of inflation targeting experienced an increase in their exchange rate variability after the adoption of inflation targeting whiles those that had a floating exchange rate regime had a fall in their exchange rate fluctuations after the adoption of inflation targeting. He therefore concludes that the fluctuations in the exchange rate whether increased or reduced, has no bearing on the adoption of inflation targeting but rather on whether a country was using a fixed or floating exchange rate regime prior to the adoption of inflation targeting.

Edwards (2006) conducted a research on the relationship between inflation targeting and the exchange rate. He used seven countries namely Australia, Canada, Korea, Brazil, Chile, and Israel. The time period covered was from January 1988 to January 2005 with only Brazil starting from June 1994 to January 2005. Monthly data for the seven countries was used. Edwards tried to find two things in relation to the exchange rate; to find out whether inflation targeting as a monetary policy affects exchange rate volatility and whether the use of a floating exchange rate regime has affected the exchange rate volatility. Models in the Generalised Autoregressive Conditional Heteroskedastic (GARCH) tradition were used to derive two equations to be estimated. Two dummy variables were introduced into the model, these were DIT which takes a value of 1 if the country has adopted inflation targeting and FLOAT which will take a value of 1 if the country has adopted a floating exchange rate regime. The work identified the GARCH process for each of the countries and then verifies stability.

The two equations were then estimated with the two dummy variables DIT and FLOAT lagged one period. It was expected that the coefficient of DIT would be significantly positive if inflation targeting increased the nominal effective exchange rate instability while that for the FLOAT dummy will also be significantly positive if the adoption of a floating exchange rate regime increased exchange rate volatility.

The results showed that the coefficient on the dummy DIT was positive but small in Australia, Canada and Korea but was not significant. He also found the DIT dummy to be negative but significant in Brazil, Chile and Israel and negative but not significant in Mexico. When the FLOAT variable was taken out, the coefficient on DIT was positive but insignificant for Chile and Brazil in their conditional variance equation. He argues that from the results, when the exchange rate is held constant, the adoption of inflation targeting reduces conditional volatility in some countries. To find out the effects of inflation targeting on real effective exchange rate volatility, Edwards estimated the two earlier equations, this time for four countries namely Australia, Canada, Chile and Israel using monthly data on real effective exchange rates. He had the same results as in the case for nominal exchange rate volatility. He concludes that there is no evidence that the adoption of inflation targeting leads to an increase in the exchange rate volatility whether nominal or real.

Petursson (2009) tried to find whether a relationship existed between inflation targeting and excessive exchange rate volatility, this is the part of exchange rate fluctuations which are not related to economic fundamentals. A sample of 44 countries was used which were made up of lower-medium income countries to more developed countries. If inflation targeting reduces the volatility of the excessive exchange rate, the specific currency's shock absorber improves which is also another important effect of inflation targeting. However if inflation targeting rather

increases this volatility, then it means that the shock absorber of the currency in question is reduced. This work used a signal-extraction approach in estimating the volatility of the excessive exchange rate.

GARCH specifications were used for estimations for each country and a panel model which has inflation targeting nations as the treatment group and the non targeting nations as the control group was used. The results according to Petursson showed that inflation targeting does not have any effect on the exchange rate volatility that can be backed by evidence. Though the GARCH results showed that volatility increased in some countries after the adoption of inflation targeting but also declined in others. Petursson argues that this may be as a result of the characteristics of the foreign exchange markets as well as the institutional support for inflation targeting but not the adoption of inflation targeting itself.

2.11 Conclusion

Over the years, monetary policy regimes have seen drastic changes all around the world. There has been more transparency, more independence and more accountability from the central banks. Many have also been successful in the pursuit of stability within their economies. One of the major changes to have taken place is the move from focusing on intermediate objectives such as exchange rates to tackling inflation more directly.

In many of these countries now using inflation targeting, such as Ghana and South Africa, had disappointing experiences with monetary targeting and fixed exchange rate regimes and so there was the need for a new monetary policy framework, thus the evolution of inflation targeting. The popularity of inflation targeting continues to increase because it is believed that inflation targeting

combines two aspects which are important to the success of monetary policy, that is, it provides a medium-term anchor for anchoring inflation expectations and also allows monetary policy flexibility in responding to short-run shocks without harming the framework's credibility.

The literature shows that inflation targeting has been successful in many countries. Inflation has fallen which should be seen as an achievement since many of these countries had been grappling with inflation before the adoption of inflation targeting. Such countries are now able to maintain lower inflation levels than they were in the past and are also experiencing lower fluctuations in their inflation rates. These results according to literature have not been attained at the expense of economic growth. In many countries, growth has been seen to rather improve. These countries have changed the way monetary policy is conducted to what is commonly known as best practice. Some are also creating a benchmark for the conduct of monetary policy.

CHAPTER THREE

REVIEW OF MONETARY POLICY AND INFLATION OUTTURN IN GHANA

3.1 Introduction

This chapter seeks to look at inflation in Ghana, namely the pre and the post Inflation Targeting era's and the various monetary policy strategies which have been adopted by the monetary authorities in trying to maintain stable prices and achieving other macro-economic goals such as balance of payments, full employment and economic growth.

3.2 Background on Inflation measurement in Ghana

Inflation is a continuous increase in the general price level of goods and services. It however does not refer to a one time increase in the price of a good or service. A misconception people have about inflation is that when there is a fall in the inflation rate, there is a fall in the general prices of goods and services. A fall in the inflation rate however generally means there has been a fall or slowdown in the rate at which prices of goods and services are increasing on the market. Inflation is measured through the rate of change of a price index. This is what is known as the inflation rate.

The two main series on which the inflation rate of a country is calculated are the Consumer Price Index (CPI) and the Gross Domestic Product (GDP) deflator. The GDP deflator can be said to be a way of presenting the inflation rate which shows the rate of price change within an economy as a whole. It is the ratio of GDP in current local currency to GDP in constant local currency (World Bank). The GDP deflator may be said to be the more comprehensive of the two ways of representing inflation since a wider array of goods and services are taken into account in its measure. It however does not give a true reflection on consumer welfare since it does not include

imported goods and services in its computation which form a large chunk of what people consume especially in Ghana.

Ghana uses the Consumer Price Index in its computation of the inflation rate. The Consumer Price Index can be said to be an index which measures the change in the price level of goods and services over time that households acquire for the purpose of consumption with reference to the price level in the base year which has an index of 100 (GSS statistical bulletin,2014).

The Ghana Statistical Service uses a new rebased consumer price index with 2012 as the base year. This was done to reflect current household consumption patterns which change from one period to another based on changes in products and/or household incomes. This is the fifth time the CPI has been rebased in Ghana with the first one being done in 1963. It is advised that rebasement be done within every five years or at a time when the consumption patterns of the population is observed to have changed.

With the new CPI, the markets covered have been increased from 40 to 42 with 13 of them being urban and 29 of them being rural. Here, a market is considered urban if more than 60% of the items in the basket could be found in that market throughout a week. It is however considered rural if it does not satisfy this criterion. The items covered within the basket were also increased from 242 to 267 items. The weight on an item within the basket reflected the proportion of household expenditure on that item. Computation of the new weights for the various items was based on the fifth Ghana Living Standards Survey (GLSS 5) as opposed to GLSS4 which was used for the previous base year's weights. The 267 items within the basket are grouped according to the Classification of Individual Consumption by Purpose (COICOP) which is derived through the gathering of monthly detailed information on prices at the individual good or service level which

is then organized into COICOP's and then assigned weights. Table 1 below gives a breakdown of the COICOP's and the weights they carry.

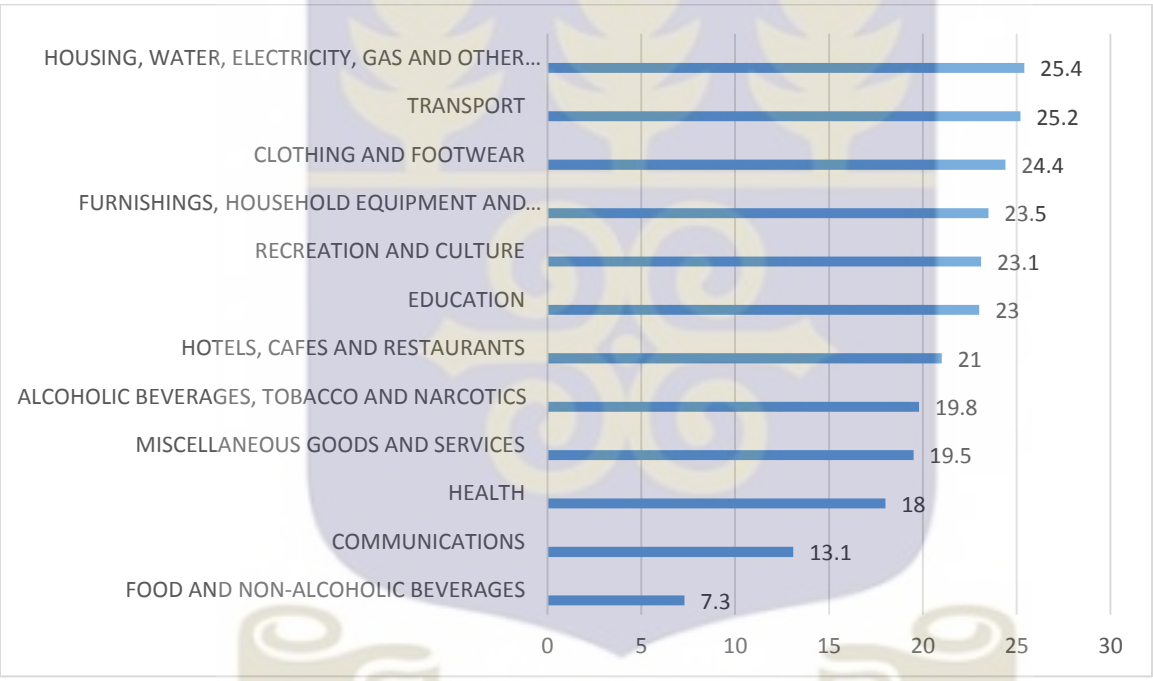
Table 1: Classification of Individual Consumption by Purpose and the Weights they carry

Item Description: COICOP Group	CPI weights
All Goods and Services	100.0
Food and Non-Alcoholic Beverages	43.6
Alcoholic Beverage and Tobacco	1.6
Clothing and Footwear	8.9
Housing, Water, Electricity and Gas	9.5
Furnishing, Household Equipment & Maintenance	4.6
Health	2.4
Transport	7.2
Communication	2.6
Recreation and Culture	2.7
Education	3.8
Restaurant and Hotels	6.0
Miscellaneous Goods and Services	7.0

Source: Ghana Statistical Service, CPI New Series Bulletin, May 2015

Food and Non Alcoholic beverages have the highest weight of 43.6 units while Alcoholic beverage and tobacco have the lowest weight of 1.6 units. This can be explained by arguing that Food and non-alcoholic beverage has the highest weights because that is where the population's total expenditure on goods and services moves while alcoholic beverages and tobacco have the lowest weights because that is where the least proportion of total expenditure of the population moves.

Figure 1: Year-on-year inflation rates (%) by COICOP major groups, March 2015



Source: Ghana Statistical Service, CPI New Series Bulletin, May 2015

3.3 The Inflation History of Ghana

This section looks at the inflation history of Ghana which dates back to the period of Ghana's independence. This has been looked at under two time periods, the pre Economic Recovery Program (ERP) era and the post Economic Recovery Program (ERP) era.

The Economic Recovery Program (ERP) was launched by the government of Ghana in 1983 under the direction of the International Monetary Fund (IMF) and the World Bank. The main purpose of the ERP was to reduce Ghana's debt and also to make Ghana better positioned in the global economy through improved trade. The ERP included policies such as reducing the level of inflation through restrictive fiscal, monetary and trade policies.

The ERP was divided into about three phases. In the first phase which began in 1983, government concentrated on reducing its expenditure. The cuts in production and the increase in efficiency in tax collection reduced the deficit from about 6.3 percent of GDP in 1981 to about 0.1 percent of GDP by 1986 (source: U.S Library of Congress). The second phase which was between 1987 to 1989 involved the government making the move to privatize most of the state owned assets and to implement foreign exchange reforms to devalue the local currency. The foreign exchange reforms almost eliminated the black market for foreign currency through the introduction of forex bureaus. In the final phase, government lowered corporate taxes to increase private sector growth and also strengthened monetary reforms.

As at the end of 1991, Ghana's international financial reputation had improved as the country was able to make its repayments on loans. Others however argued that the ERP did not bring any transformation to the economy as the country still relied on income from agricultural commodities especially cocoa.

3.3.1 Pre ERP Inflation

Sustaining stable prices is one of the major macro-economic objectives of an economy however inflation has been one of Ghana's major macro-economic problems since independence in 1957. Inflation is mainly an excess demand phenomenon induced by an excess supply of money (Lovoie, 1996 p 535).

Ghana's inflation problems after independence were mainly as a result of excessive demand pressures which were due to monetary expansion to finance the fiscal deficit. The first five years after independence experienced stable prices. These years were characterized by single digit inflation (Ocran, 2007). The 1970's and early 1980's however had very high inflation levels, with inflation going as high as about 123% in 1983.

After independence, Ghana in its quest to industrialize resorted to import substitution to reduce the importation of finished goods which could be produced locally. This led to the creation of import substitution industries which unfortunately relied heavily on imported goods and services. These industries were however inefficiently run because of the protection they received from the state in terms of government subsidies, tax rebates and other incentives from the state. There was also the problem of scarce foreign exchange to buy inputs for these firms. The investment in infrastructure between independence and 1965 was evident in increasing demand rather than an increase in output. This pushed prices upward. Till 1963, the government fought inflation by relying on foreign exchange reserves which had been accumulated before independence to finance its fiscal deficits (Sowa and Kwakye, 1993). Between 1964 -1966, Ghana began to experience inflation. This was due to the depletion of the foreign exchange reserves and the high cost of duty in importing inputs for the various industries which led to the government using bank financing in

balancing the budget deficit. In 1964 Ghana recorded an inflation rate of 15.8% which was due to the increase in money supply that year, which increased by 37.2%. The government tried to slow down the growth in money supply in subsequent years but the harm had already been done. This was also worsened by the shortage of foreign exchange and the high cost of duties on inputs (Sowa and Kwakye, 1993).

In 1966 a new government was formed which was the National Liberation Council (NLC). This government tried to remedy the situation by cutting down public spending and the use of bank financing and reduced the involvement of the government in investment. This led to a reduction in output. Monetary policy was also tightened by increasing interest rates and introducing credit ceiling. These stabilization programs were sponsored by the IMF. Inflation rate declined from 15.8% in 1964 to -9.7% in 1966 and to 10.7% in 1968. This decline in inflation however came at a cost as there was a decline in economic activity. Between 1969 -1971, there was a resurgence of economic activity which immediately followed the period of the IMF stabilization program. This was characterized by an increase in government investment, which was funded by foreign exchange reserves and external borrowing. This period was also characterized by an increase in private sector participation. Monetary policy was however tightened to ensure financial stability, by increasing interest rates and using credit restrictions. This however did not achieve its desired goal. Liquidity was not significantly reduced due to seasonal financing of cocoa and the provision of loans to the private sector. Inflation however was restrained from reaching excessive levels within this period. This was attributed to an increase in domestic output growth and an increase in the price of cocoa in 1970.

The period 1972-1982 was characterized by major fiscal expansion. One of the highest the country had ever seen during that period. This period was also characterized by frequent changes in

political regimes who mostly pursued fiscal expansionary policies. These policies were funded mainly by bank loans to the government. There was an attempt to control the inflationary pressures which had been created by using price, exchange rate and interest rate controls. This led to distortions in prices, relative slow down of the economy and finally shortage of goods and services which put pressure on prices to move upwards. Several economic controls and restrictions within this period led to many malpractices. These included smuggling, black market activities and corruption (Sowa and Kwakye, 1993). Even though mechanisms such as price controls were put in place to contain inflation, the inflation rate averaged 50% per annum within this period, going as high as about 117% in 1977 and 1981. Inflation within this period was clearly a consequence of excessive demand, fiscal expansion and monetary growth which was resorted to in order to finance the deficits. This was worsened by some structural constraints. One of these constraints was scarcity of foreign exchange. This was due to the over reliance of Ghana on the proceeds from the export of cocoa which was unreliable. Another was the low production of food crops. This was due to factors such as bad weather, low productivity and inadequate storage facilities. The manufacturing sector was also not producing enough to make up for the short-fall. This was due to inadequate inputs which had to be imported using scarce foreign exchange.

3.3.2 Post ERP Inflation

The Provisional National Defence Council (PNDC) in mid 1983 adopted the Economic Recovery Program (ERP). This was due to the adverse economic situation the country found itself in. The ERP was supported by the IMF and the World Bank with the main aim of reversing the slide in the economy to achieve sustainable economic growth. Control of inflation has been one of the

major objectives under the ERP. Due to the fact that pre 1983 inflation was mainly as a result of financing the deficit, the ERP focused on reducing the budget deficits and the reliance on bank finance in financing the deficit. The revenue side saw some improvements after the adoption of the ERP through the enlargement of the tax base and improvements in administration. In spite of this, monetary growth was still high, with an annual average of about 40%, between 1983-1989. Some of the sources of the liquidity injection within the economy was through recurrent expenditure, which still remained high, undertaking developmental projects which relied on external financing, loans and foreign resource receipts or infusions into the local economy. A year on after the introduction of the ERP, the inflation rate fell from about 123% to about 40%. This huge fall in the inflation rate is often attributed to the program, however this is debatable since the program did not fully take off till 1984 and the country recovered from the drought of 1983 which reduced the scarcity of food. However, the inflows from the ERP eased the supply constraints in the economy.

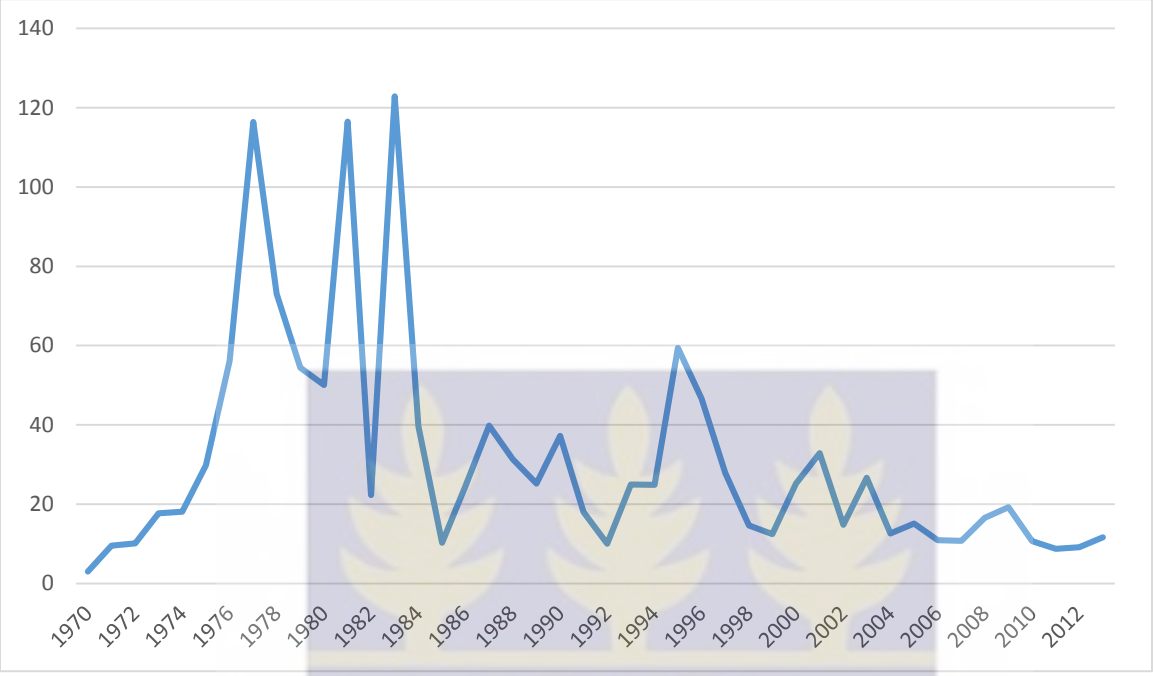
Those who argue that the ERP was responsible for the decline in inflation attribute the fall in inflation within the first year to the increased production of foodstuffs, leading to a fall in the prices of agricultural commodities which attributed for about 50 to 60 percent of the Consumer Price Index. The fall in inflation was also attributed to the ERP because the increase in the external inflows into the country and the liberalization of the economy in a way helped relieve the country of the supply constraints it faced. Within a decade after the implementation of the ERP, inflation levels fell, but not to the desired levels. Inflation began to increase and fluctuate from 1993 onwards after it went as low as about 10 percent in 1992.

On average, annual inflation rose to as high as about 60 percent in 1995 and then declined to about 47 percent in 1996. These fluctuations continued into the year 2000 where the average annual

inflation reached about 20.8 percent by the third quarter of the year despite the fact that the annual average inflation was at about 12.9 percent at the start of the year. This increase can be traced to the depreciation of the value of the cedi and the increase in fuel prices which automatically had an effect on the agricultural sector, leading to high cost of foodstuffs. Inflation in 2003 was about 23.6 percent which was higher than the 2002 rate of about 15.2 percent. Inflation rate however fell to 11.8 percent as at the end of 2004. This fall is attributed to the fall in the prices of food items within this period. Inflation in 2005 was at 14.8 percent. This however declined to about 10.5 percent in 2006. It increased again in 2007 hitting a rate of 12.7 percent.

Though the ERP which used the monetary aggregates targeting regime showed some signs of reducing inflation, the inflation rate was very unstable. The inflation rate in 1985 was 10.3% but rose to a high of 24.6%. It rose again to 39.8% in 1987 but fell to 31.4% in 1988. The main motive of the monetary authority in moving from the monetary aggregates targeting regime to the inflation targeting regime was to reduce the volatility of inflation and also to enhance transparency (Kyereboah-Coleman, 2012).

Figure 2: Annual Inflation Rates for Ghana (1970-2013)



Source: Computations based on CPI obtained from the World Development Indicators, 2015

3.4 Causes of Inflation: Monetarists and Structuralists Argument

The monetarist and structuralist schools of thought are the two main schools of thought when it comes to explaining the causes of inflation (Gockel and Abbey, 2014). Monetarists believe that inflation is caused by 'too much money chasing few goods' (Gockel and Abbey, 2014).

The Monetarists from the Chicago school base this on the equation of exchange (M.V = P.Q) where M is the quantity of money, V is the velocity of money or the number of times a unit of a given currency circulates within the economy in a year, P is the price level and Q is the gross domestic product.

Monetarists argue that in real terms if the rate of growth of velocity and output are held constant in the shortrun, prices will be determined by the quantity of money within the system (Gockel and

Abbey, 2014). This means that an increase in money in the system increases the level of inflation. Monetarists argue that to achieve stability in prices, the increase in money supply should be stable, at a rate in line with the economy's real output capacity (Gyebi and Boafo, 2013). They further argue that though resource price shocks or shortages may lead to increases in prices within the shortrun, in the longrun inflation is caused by excess liquidity in the system (Gockel and Abbey, 2014).

Structuralists however argue that less developed countries are more likely to have problems with inflation by virtue of how their economies are structured (Gyebi and Boafo, 2013). They believe that inflation originates from supply side factors and so the argument that increases in money supply leads to excess demand and hence increases in inflation are untenable. Structuralists argue that the major causes of inflation are the inelastic supply of food which is caused by the concentrated structure of land ownership and the overdependence on capital imports by developing countries who lack enough foreign reserves to be able to sustain such habits (Gockel and Abbey, 2014).

There is therefore a difficulty in how best to fight inflation, Monetarists believe that deficits should not be encouraged since financing them may lead to increases in inflation. Structuralists on the other hand believe that given the underdeveloped nature of markets in developing countries, imbalances in their domestic accounts are expected (Gockel and Abbey, 2014).

3.4.1 Causes of Inflation in Ghana

Over the years, Ghana has achieved some successes in the areas of education, transportation and industrialization however these successes have not been achieved without some consequences of

falling external reserves, imbalances in the balance of payments, instability in the financial system and the major problem of inflation. The maintenance of low stable prices does not only affect the macroeconomic stability of the country but also affects its people especially the poor who do not have effective hedges against inflation. Inflation also affects long term planning of especially businesses. It also affects public confidence in the economy when it is long and persistent. This affects individuals' views on risk taking and investment which are very important to the development of the economy.

The major causes of inflation in Ghana according to literature are the monetary or demand factors and the supply or real factors. Most research conducted in Ghana seem to lean towards demand or monetary factors as the main cause of inflation in Ghana (Gyebi and Boafo 2013). Ahmad (1970) and Lawson (1966) found that the major cause of inflation was deficit financing. Debts incurred by governments which were usually financed through borrowing from the local banking system generated strong inflationary pressures on the economy. This they said pointed to the fact that inflation in Ghana was mainly of the demand or monetary type. They however also argued that shortage of some basic consumer goods and restrictions on imports also further strengthened inflation. This they said pointed to some level of real factors also causing inflation.

The Bank of Ghana argues that its financial support to the central government in its fiscal expansionary policies caused the money supply to increase by an average of about 40 percent per annum. It is believed that this caused the high levels of inflation which averaged about 50 percent per annum within the 1960's and 1970's and early 1980's. Gyebi and Boafo (2013) also found out that the main macroeconomic factor causing inflation in Ghana was money supply also pointing to the monetary or demand factors as the main cause of inflation in Ghana. They believed that the lack of independence of the central bank especially during the pre-ERP period led to the inability

of the central bank to check the level of liquidity in the system when it came to financing the government deficit. The central bank was required to implement its policies in consultation with the minister of finance making it difficult for the Bank of Ghana to check the deficits of the government and more difficult refusing to finance these deficits. Another reason for the high money supply in the system they believed was through cocoa financing. Under the pre-ERP period, financing of the cocoa sector was done through the issuance of cocoa bills and overdrafts which when received, were then loaned out by the central bank increasing the money supply and ultimately increasing or causing inflation.

Sowa and Kwakye (1993) however argued that real factors were the major cause of inflation in Ghana. They argued that the other researchers had monetary factors as the main cause of inflation in Ghana because they captured some real factors as monetary factors and so came out with the conclusion that monetary factors were the major cause of inflation in Ghana. In their findings, supply constraints came out as the main cause of inflation in Ghana and other factors such as exchange rate devaluation also was significant but not as strong as the supply constraints.

Gockel and Abbey (2014) argue that inflation in Ghana is made up of both monetary and structural factors with the effects of monetary factors being dominant in the longrun and the effects of the structural factors being dominant in the shortrun. In their findings, inflation inertia, fluctuations in exchange rate and domestic cereal production were more influential in affecting Ghana's inflation compared to money supply.

"inflation inertia refers to the situation where past values of inflation or past expectations about its current level, have a direct influence on its current value" (Gockel and Abbey, 2014). They argue that this is the main factor responsible for changes in Ghana's inflation level. Inflation inertia is

mostly felt in the structure of wage negotiations where if a group of workers ask for a wage increase, other professionals linked to the aforementioned profession also ask for wage increases irrespective of their productivity levels. This cycle continues to push the level of inflation upwards.

They also argue that, cereal production is also a major factor influencing Ghana's inflation level. Holding all other things constant, negative shocks to domestic cereal production will lead to unfavorable effects on the level of inflation. Other causes of inflation as found by Gockel and Abbey (2014) are; the exchange rate, world prices and money supply. Money supply though influential in Ghana's inflation level, was found not to be as important as inflation inertia.

One can deduce from the above that inflation in Ghana is not caused by a single factor, be it a monetary factor or a real factor but is however caused by both monetary and real factors with one usually dominating at a point in Ghana's history. One can also say that one form, be it monetary or real factors, strengthens the other.

3.5 Monetary Policies in Ghana

Monetary policy can be said to be the actions of a central bank or any other regulatory authority that determines the size or rate at which the money supply grows aimed at achieving healthy economic development which includes achieving price stability, economic growth, equilibrium in the balance of payments and achieving full employment (Amadeo, 2014). In Ghana this is done by the Bank of Ghana which has the mission of pursuing monetary policies which is aimed at achieving price stability to create a conducive environment for sustainable economic growth. Since the adoption of the Economic Recovery Program, Ghana's financial system and hence ways of

conducting monetary policy has gone through some changes but with the same goal of price stability being the main goal of monetary policy. Some of these changes include the change in tools used in conducting monetary policy from direct monetary tools to indirect monetary tools

3.5.1 Direct Control of Monetary Policy in Ghana

Until about 1983 Ghana was using direct monetary controls in its conduct of monetary policy (Bawumia, 2012). This was in the form of ceilings on credit from the commercial banks to the private sector and the regulation of interest rates. The credit control system involved the Bank of Ghana giving out directives to the commercial banks to make their resources available to the sectors of the economy that were seen as productive, most especially the agricultural sector. Within this period, commercial banks were made to loan out only about 20 percent to 30 percent of their funds to the private sector. The central bank also imposed high reserve requirements. The interest rates were regulated through the imposition of floors and ceilings for both deposit and lending rates. Reserve requirements were used mainly to supplement credit controls during this period.

The central bank carried this out by determining the growth in money supply for a given year based on set inflation and economic growth targets. It then had to determine the growth in credit that will help in attaining the growth in money supply. Then distribute this credit among the various commercial banks and monitor their compliance to the directives. The Bank of Ghana at the start of each year sent out two policy guidelines, the general ones and the specific ones. The general guidelines comprised of credit distribution and interest rate regulations by economic sectors while the specific ones were ceilings on total credit that each bank was entitled to. The Banking Supervision Department of the Bank of Ghana was responsible for sanctioning all banks that did

not adhere to these directives. The major advantage of this system of monetary management was the ease with which it could be implemented.

This system however came with some problems in that the high level of reserve requirement as well as the credit ceilings led to high levels of accumulated credit. The commercial banks had no way of investing them or loaning them out because of the restrictions placed on them. This was a disincentive to the commercial banks to mobilise extra savings from the public. The restriction also kept interest rates on borrowing especially to government and its institutions low, meaning government could borrow at very low interest rates as against higher rates to the private sector reducing its cost of borrowing. This led to negative real interest rates, another disincentive to savings mobilization.

3.5.2 Indirect Monetary Controls in Ghana

The process of liberalization restructured the monetary sector. One major change brought about by the liberalization was the use of a market based monetary management system. This system relied on indirect instruments in managing monetary policy as against the direct instruments which were used prior to the liberalization. The major tool under this system that the Bank of Ghana has relied on is the use of open market operations.

This is the process where the Bank of Ghana buys or sells government securities depending on the direction in which they want monetary policy to move. It transfers funds from the general public and institutions to the government or from the government to the general public and other institutions. This leads to an increase or decrease in the monetary base. During periods of inflation,

the central bank sells government securities to financial and non financial institutions as well as to the general public to reduce the liquidity in the system which is aimed at driving the inflation rate down. At times of recession, the central bank buys back the government securities. This is aimed at increasing the money supply to stimulate the economy. Open market operations was introduced around 1986 in the form of primary weekly auctions in treasury bills. The Bank of Ghana also brought in the Bank of Ghana bills which it introduced in 1988. This was later withdrawn as the interest payments on these bills became very high and unsustainable.

Reserve requirement is also another tool used by the Bank of Ghana. This is a minimum percentage of deposits that commercial banks are required to keep. The rate is set by the Bank of Ghana. This tool is more immediate and drastic compared to the open market operations. Prior to the introduction of the financial reforms, the Bank of Ghana operated a two tier system of reserve requirement. These were the demand deposit and the savings and time deposits reserve requirements. These two had different reserve ratios. This system of reserve requirement was removed by the Bank of Ghana in the early 1990's to a uniform one where one reserve requirement ratio applied to all deposits.

Other tools at the disposal of the bank of Ghana which have at one point in time been used or are still in use are the policy rate. This when increased, increases the market interest rate making credit more expensive and when reduced, reduces the market interest rate making credit less expensive and thereby increasing liquidity. The repurchase agreements; this is where the Bank of Ghana sells securities to the commercial banks with an agreement that they would be sold back to the Bank of Ghana at a stipulated date. The transfer of government deposits; which involves the government transferring its deposits between the commercial banks and the bank of Ghana to control the amount of credit created by the commercial banks in order to control the money supply.

3.6 The Monetary Policy Committee (MPC) and its Processes

The Monetary Policy Committee of the Bank of Ghana is a seven member committee made up of:

1. The governor

2. The two deputy governors,

3. The head of the banks research department,

4. The head of banking operations and

5. Two others who are chosen by the minister of finance from outside the Bank.

The MPC has bi-monthly meetings and has six meetings each year. These bi-monthly meetings run for two days, starting on a Monday and ending on a Tuesday followed by a press conference on Wednesday to give the general public information on the decisions of the MPC. The MPC was established by the Bank of Ghana act 612 (2002) section 27 which states that:

1. There is hereby established a committee of the Bank to be known as the Monetary Policy Committee of the Bank

2. The monetary policy committee shall be responsible for

   a. Initiating proposals for the formulation of the monetary policies at the Bank
   b. Providing the statistical data and advice necessary for the formulation of monetary policies

3. The members of the Monetary Policy Committee shall be

   a. The governor

b. The first and second deputy governors

c. The head of monetary policy analysis of the bank

d. The head of banking operations of the bank and

e. Two other persons appointed by the minister being persons with knowledge or experience relevant to the functions of the Monetary Policy Committee.

4. The members of the MPC other than the full time members shall be paid such allowances as the board shall determine.

The main instrument used by the MPC is the policy rate. This rate gives indications as to where the economy is moving in terms of inflation and other variables within the economy. A reduction of the policy rate signals that the central bank is pursuing an expansionary monetary policy while an increase in the policy rate is an indication of contractionary monetary policy.

At every meeting and before the setting of the policy rate, the MPC evaluates the macro economic indicators within the economy and how a new rate whether higher or lower will affect these indicators and the economy as a whole. The Committee takes into account data and other reports on areas such as the banking sector, the fiscal sector and the real sector. These sectors will give the committee an idea of which direction the policy rate should move. The MPC pays particular attention to the monetary sector. This is because based on literature, there exists a direct relationship between money growth and the inflation rate.

3.7 Inflation Targeting in Ghana

Ghana moved from a controlled monetary policy regime to the monetary aggregates regime before adopting inflation targeting. The credit control regime was used till 1983 (Bawumia, 2012). Money supply targets were set for the economy with inflation as the primary goal and growth as the secondary goal. The domestic credit within the economy was used to attain the set money supply target. This domestic credit was then determined with the government portion based on the Public Sector Borrowing Requirements (PSBR) while the remainder went to the private sector. The private sector portion of the domestic credit was then shared among the commercial banks.

The banks were made to put limits on loans given to the various sectors. This was based on the notion that some sectors were more important than others in contributing to the growth of the economy. This monetary policy was however abandoned due to the inability of this policy in attaining set inflation targets. This period recorded some of Ghana's highest inflation levels with inflation going as high as about 123 percent in 1983. This was mainly attributed to exceeding the set domestic credit ceiling, as the ceiling set for government was often violated (Kwakye, 2012). This compromised the inflation targets.

The monetary aggregates also targeted the money supply as the means of achieving inflation objectives. The use of the monetary aggregates targeting policy officially ended in 2006. Under this monetary policy regime, the Open Market Operation (OMO) took the place of domestic credit as the operating tool. OMO involved selling and buying of treasury securities by the central bank.

In periods of excess liquidity, treasury securities were sold to mop up the excess liquidity. In periods where the central bank wanted to increase liquidity in the system, it sold treasury securities. In the case of Ghana, treasury securities were mostly sold to mop up excess liquidity in the system

which emanated from massive deficit financing (Kwakye, 2012). OMO however had some challenges. OMO funds found their way back into the budget as the government resorted to direct financing from the central bank, defeating the main purpose of OMO. This ended up in inflation targets being missed. This period also experienced high inflation levels though they were not as high as under the controlled regime. Inflation during this period went as high as about 60 percent in 1995. This led to the adoption of the inflation targeting monetary policy.

Ghana's inflation targeting is conducted through periodic adjustment to the Bank of Ghana's policy rate target. The interest rate is kept at a particular rate using open market operations. The rate is kept at this level for as long as it is needed to achieve its aim of maintaining price stability. This can be for months. This rate is periodically reviewed by the Monetary Policy Committee. This review is done in response to the various macro-economic indicators so as to be able to give a more accurate forecast of their trends in order to achieve the set inflation target rate.

Since the formal adoption of inflation targeting in May, 2007 the main aim of the Bank of Ghana has been to achieve and maintain a single digit inflation rate. Even though inflation targeting had been started in 2002, a formal announcement had to be made to keep the Bank of Ghana accountable for its objective of maintaining price stability as contained in the Bank of Ghana Act 2002. One key ingredient needed for inflation targeting to be a success is transparency. This is ensured by the processes of the Monetary Policy Committee through its periodic press conferences which gives journalists the opportunity to ask questions concerning the decisions of the Committee and the direction in which the Committee wants to move the economy. Reports released by the Monetary Policy Committee after their meetings also help in achieving a more transparent process as anyone and everyone can access these reports to gain information on the Committee's processes.

Since the implementation of inflation targeting, there has been a fall in the inflation expectations by about 100 percentage points (Opoku-Afari, 2005). There however have been a few instances where the inflation expectations have increased. One such case was in the second quarter of 2002. This was attributed to anticipated fuel price increments in Ghana. This trend continued till early 2003 when the price increases were announced. An increase of the policy rate by the Bank of Ghana in 2003 helped to contain the increase in expectations and later led to the fall in expectations (Opoku-Afari, 2005)

This increased the confidence market players had in the Bank of Ghana concerning how the bank effectively handles shocks. This led to a further decline in inflationary expectations. In February 2005 there was a deregulation of the petroleum sector which led to upward adjustments in fuel prices, however, this did not affect expectations significantly with a continued general downward trend in inflationary expectations. Opoku-Afari (2005) argues that with downward movement in inflationary expectations comes downward movement in inflation. This is evident from the lower inflation figures attained within the inflation targeting period compared to the monetary aggregates period. Inflation fell to a low of about 9 percent in 2011.

According to Bawumia (2012), inflation targeting has produced the best performance in key macroeconomic indicators since independence. He also argues that the economy has shown more resilience to external shocks under inflation targeting monetary policy compared to the controlled regime and the monetary aggregates regime.

3.8 Developments in the Monetary Sector

Ghana has a relatively well-developed banking system. Though this may be the case, it was not that way some years ago as the governments of the 1960's and 1970's used these banks to support their programmes. This use of the banks by government led to some losses by some of the banks. The banking system therefore had to be restructured to make monetary policy more efficient and effective.

This led to the introduction of weekly sales of treasury bills. The Bank of Ghana also moved away from the use of direct tools for its monetary management to the use of indirect tools in its monetary management. Due to the negative consequences of financial repression which was in use during this period, the financial sector adjustment programme was introduced to help restructure the financial system between 1988 and 1990 by increasing the mobilization of savings, developing the money and securities market and increasing the efficiency in the credit allocation system. A new banking law was introduced in 1989 which was aimed at strengthening the banking system.

As a consequence of this new law, banks were asked to have 6 percent of net assets as minimum capital requirement, with the Bank of Ghana having the authority to change this figure. Between 1990 and 1991 the second phase of the financial sector adjustment programme was introduced which was a modified version of the first phase. A law for non-bank financial institutions was also introduced in 1993. In liberalizing the financial sector, a number of laws were passed for the deepening of the financial system, making transactions within the sector easier and the strengthening of the Bank of Ghana. These laws included the payment system act and the banking system act. The processes for the bills to be passed into law were started around the year 2000 and since then the Ghanaian financial system has seen some massive improvements.

CHAPTER FOUR

METHODOLOGY, ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter uses Econometric techniques to estimate the effect of inflation targeting on some key macroeconomic variables in Ghana. These variables are inflation, real output growth rates, real exchange rates and the growth in money supply. This work uses a "before-and-after" strategy. This strategy involves looking at the extent to which inflation targeting has influenced the performance of these macroeconomic variables in the pre and post inflation targeting eras. The performances of these variables are compared for the pre and post inflation targeting eras to see whether the impact of inflation targeting has been positive or negative.

This chapter is divided into two parts. The first part which is the methodology discusses the approach the work takes in addressing the research problem. The second part is made up of the analysis and discussion. Here, data is analyzed and the results obtained are discussed and also compared to existing literature to see whether Ghana's experience with inflation targeting conforms to existing works conducted in the area.

4.2 Sources and Type of Data

This work uses time series data in its analysis. Time series can be defined as a succession of observations which are ordered in space or time. The main feature of time series data which makes it important to this work is its trend properties. This is the movements in time series over time.

Trend helps in identifying the direction of movement of a variable, whether upward or downward. This is very important in this analysis. Because of the nature of the analysis and the various macroeconomic variables, secondary data is sourced from different places. The various sources of data used in this work are;

The World Bank's World Development Indicators (WDI)

The Ghana Statistical Service

The Bank of Ghana

A research population can be said to be a large collection of objects which usually forms the focus of a scientific query (www.explorable.com). The study population used in this work is all annual rates of inflation, GDP growth rates, Exchange rates and M_2 growth rates from 1984 to 2013, a period of 30 years. The pre inflation targeting era is from 1984 to 2001, an eighteen year sample while the post inflation targeting era starts from 2002 to 2013, a twelve year sample. The work adopts the unofficial commencement of inflation targeting in Ghana to give the post inflation targeting era more observations.

4.3 Descriptive statistics

Descriptive statistics is the starting point where the work tries to find out the performances of the various macroeconomic variables in the presence of inflation targeting. Under this, the macroeconomic variables under review (inflation, real economic growth, exchange rate and growth in money supply) are looked at in terms of the impact of inflation targeting on their performances by comparing the performance of the variables during the pre inflation targeting era

to the performances during the post inflation targeting era. Descriptive tables are employed under this part, to give a visual impression of the performance of inflation targeting. The variances that is the standard deviations and the averages or means will be calculated for each of these variables and under each of these regimes. The standard deviations and means for each variable under the two regimes are then analyzed using descriptive tables as done in Coleman (2012).

The conclusions of this research cannot be based on what is obtained from the descriptive statistics and so this work goes further to substantiate or disprove the results obtained from the descriptive statistics by employing a quantitative approach via the VAR technique.

4.4 Independent Sampling Technique

A further review of the impact of inflation targeting on given macroeconomic variables is done using an independent sampling technique for small sample inferences about the difference between two means as adopted in Bempong (2008). The independent sampling technique is used to determine whether there is a significant difference between two means. In this case, whether there exists a significant difference between the pre and the post inflation targeting eras. This is used to find out whether as a matter of fact, there has been any difference or impact of inflation targeting on the macroeconomic variables under discussion between the pre and the post inflation targeting eras. This gives further backing to the descriptive statistic test. With the assumption of normality and equal variance for the series, a pooled estimator is framed.

Now assuming S_1^2 is the variance for the series of the variables in the post inflation targeting regime while S_2^2 is the variance for the series in the pre inflation targeting era, then the pooled sample estimator of the variances takes the form:

$$S_p^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

OR

$$S_p^2 = \frac{\Sigma(X_1 - \overline{X_1})^2 + \Sigma(X_2 - \overline{X_2})^2}{n_1 + n_2 - 2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where n_1 and n_2 are two sample sizes, X_1 and X_2 are the sample observations and $\overline{X_1}$ and $\overline{X_2}$ are the means for the post and pre inflation targeting eras. Now assuming u_1 is the population mean for the post inflation targeting era and u_2 is the population mean for the pre inflation targeting era, a small sample test statistic can be obtained for testing the following hypotheses:

H_0: $(u_1 - u_2) = 0$ (which means that the difference between the two population means is not significant)

H_1: $(u_1 - u_2) \neq 0$ (which means that there exists a significant difference between the two population means)

Substituting S_p^2 into the 2 sample z-statistic formula gives;

$$G = \frac{(\overline{X_1} - \overline{X_2})}{\sqrt{S_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

This is a two-tailed t-test with $(n_1 + n_2 - 2)$ degrees of freedom. Here, the null hypothesis H_0 will be rejected if the test statistic falls within the rejection region and the conclusion will be that there has been a significant impact on the variable in question under inflation targeting. If the null hypothesis is accepted, the conclusion drawn is that there has been no significant impact of inflation targeting on the variable in question. This will be used for all macroeconomic variables under review in this work.

Because of the difficulty in examining the assumptions of equal variance and normality, another method to verify the results obtained from this method is needed. This work therefore also adopts regression analysis in verifying the results obtained from the independent sampling technique.

4.5 Stationarity and Unit Root Test

A unit root is important for time series analysis. This is to ensure that variables included in a model are stationary. That is, the variables should have a constant mean and constant variance. This will make values obtained from a model 'sensible'. If variables in a model are not stationary, the normal procedures of investigating relationships among variables such as the Ordinary Least Squares (OLS) Technique makes no sense. The unit root test adopted in this study is the Phillips-Perron test. This test is nonparametric when it comes to nuisance parameters and so it allows for a wide array of time series models in which there are unit roots (Phillips and Perron, 1988). It offers a significant advantage over the Dickey-Fuller test in situations where there are moving average components in the time series. "Phillips and Perron's test statistics can be viewed as Dickey–Fuller statistics that have been made robust to serial correlation by using the Newey West heteroscedasticity and autocorrelation-consistent covariance matrix estimator" (www.stata.com).

If variables are found to be stationary, the Vector Autoregressive model can be estimated in levels. If some variables are found not to be stationary, Co-Integration tests are needed to bring out any longrun relationships between the system variables. In the presence of Co-Integration, an Error Correction Model (ECM) representation of the VAR is needed for estimation. This allows for longrun relationships among system variables.

From the Phillips-Perron unit root estimation, all variables are found to be statistically significant at the five percent level of significance. The null hypothesis of the existence of unit root is rejected for all variables meaning that all variables are stationary.

4.6 Model Specification and Choice of Lags

This work adopts the Vector Autoregressive Models (VAR) in representing and analyzing the four time series variables under consideration. The VAR approach is used for multivariate time series where endogenous variables may appear on both the right hand side and the left hand side of the equation. The VAR approach models every endogenous variable in the system as a function of the lagged values of all endogenous variables in the system. The main benefit of using a VAR approach is that the system can be estimated by Ordinary Least Squares (OLS) since there are only lagged values of variables on the right hand side and so there is no problem of simultaneous equation. Due to the stationarity of the variables in levels, the study goes ahead to estimate a VAR model in levels without the use of Co-Integration or the Error Correction Model (ECM).

Assume $Y_t = (Y_{1t}, Y_{2t}, \ldots, Y_{nt})$ is a vector of time series variables then a general p-lag VAR model takes the form: $\{Y_t = c + \Pi_1 Y_{t-1} + \Pi_2 Y_{t-2} + \cdots + \Pi_p Y_{t-p} + e_t, t = 1, \ldots, T\}$ where Π_i are

(n×n) matrices of coefficients and e_t is an (n×1) unobservable white noise vector process with zero mean. That is, it is serially uncorrelated and with a time invariant covariance matrix.

According to Sims (1980) conventional models of VAR are restricted, that is, binding restrictions are placed on the model parameters. However, he argues that economists should rather use unrestricted VAR's since the restrictions have no substantive justifications. This work therefore uses an unrestricted VAR model as specified by Runkle (2002) which has been extended to accommodate the extra variables in this work.

For the choice of appropriate lags for the study, the Schwarz-Bayesian Information Criterion (SBIC) is chosen to determine the number of appropriate lags to be used. " SBIC could be advocated when the primary goal of the modeling application is descriptive, that is, to build a model that will feature the most meaningful factors influencing the outcome, based on an assessment of relative importance" (Cavanaugh, 2012). He however argues that the Akaike Information Criterion (AIC) is more suited to predictive models. The nature of the study therefore, warrants the use of the SBIC. From the SBIC, the appropriate number of lags for this study is one. The Vector Autoregressive Models of order 1, for the four macroeconomic variables under consideration are as follows:

$$INF_t = \alpha_1 + \beta_{11} INF_{t-1} + \beta_{12} GDP_{t-1} + \beta_{13} EXCH_{t-1} + \beta_{14} M_{s_{t-1}} + \delta_1 IT + V_{1t} \ldots\ldots\ldots\ldots (4)$$

$$GDP_t = \alpha_2 + \beta_{21} INF_{t-1} + \beta_{22} GDP_{t-1} + \beta_{23} EXCH_{t-1} + \beta_{24} M_{s_{t-1}} + \delta_2 IT + V_{2t} \ldots\ldots\ldots\ldots (5)$$

$$EXCH_t = \alpha_3 + \beta_{31} INF_{t-1} + \beta_{32} GDP_{t-1} + \beta_{33} EXCH_{t-1} + \beta_{34} M_{s_{t-1}} + \delta_3 IT + V_{3t} \ldots\ldots\ldots\ldots (6)$$

$$M_{s_t} = \alpha_5 + \beta_{41} INF_{t-1} + \beta_{42} GDP_{t-1} + \beta_{43} EXCH_{t-1} + \beta_{45} M_{s_{t-1}} + \delta_4 IT + V_{5t} \ldots\ldots\ldots\ldots\ldots (7)$$

Where:

INF_t = The inflation variable at time t. Yearly inflation rates are used for the inflation variable in the analysis of this work

GDP_t = The Gross Domestic Product variable at time t. Yearly growth rates in the Gross Domestic Product are used in the analysis of this work

$EXCH_t$ = The Exchange Rate variable at time t. Annual Real Effective Exchange Rates are used in this work as used in Edwards (2006).

M_{s_t} = The growth in money supply variable at time t. Annual growth rates of M_2 are used in the analysis of the various equations

IT = A dummy variable for inflation targeting. It takes the value of zero during the pre-inflation targeting era and a value of one during the post- inflation targeting era. [1984-2001=0, 2002-2013=1]

α_i = The constant term in the various equations

β_{ii} = The parameter term for the various macroeconomic variables under consideration in the various equations for the first lag

δ_i = The parameter term for the Inflation Targeting dummy (IT) for the various equations

V_{it} = The error term in the various equations. The error term is assumed to have a mean of zero and there is no correlation among error terms.

The lagged values of the various macroeconomic variables on the right hand side of each equation serve as controls in each equation. The most important variable in each model is the Inflation Targeting dummy. This is important because the work looks at its effects on the endogenous variable in each model under consideration.

This work estimates the four equations above, each incorporating the objectives of the study in finding the effects of inflation targeting on these macroeconomic variables.

4.7 Test for Serial Correlation

Serial correlation is a major problem for time series data. Serial correlation occurs when error terms for different time periods are related. Serial correlation may lead to problems with the efficiency of estimates. It may also lead to the understatement of the variance as well as the overstatement of the R^2 which will invalidate the 't' and 'F' tests (Yin-Feng, 2002). This may lead to some hypotheses being rejected when they should not.

This study therefore tests for serial correlation using the Breusch-Godfrey Lagrange Multiplier (LM) test for serial correlation. The Breusch-Godfrey Lagrange Multiplier (LM) test for serial correlation is best suited for models where the dependent variable is represented in the model as

independent variables through using the lagged values of the dependent variable. This is therefore best suited for this study.

4.8 Estimation Results

Here, the results that have been obtained from the various estimation techniques used are discussed in line with the objectives that were laid out in the first chapter of this work. The work employs the standard tests of regression analysis which are, the R^2, the t-test and the Adjusted R^2 to determine the robustness of the estimation results.

4.8.1 Results From Descriptive Statistics

Results obtained from the descriptive statistics tests using difference of means, standard deviations and variances are shown in tables and discussed below

Table 2: Performance of Macroeconomic Variables under pre and post targeting eras

	Pre-IT Period			Post-IT Period		
	Mean	Standard Deviation	Variance	Mean	Standard Deviation	Variance
Inflation	28.06	13.14	172.58	13.90	5.10	26.02
GDP Growth	4.71	1.19	1.42	7.16	2.90	8.44
Echange Rate	184.40	118.58	14060.23	97.49	6.26	39.24
Growth in Money Supply	42.93	12.95	167.73	29.99	7.70	58.94

Source: Computed by Author from data obtained from World Development Indicators, 2015

Table 2 above gives the descriptive statistics of the various macroeconomic variables under discussion. The table shows a decline in the mean inflation rate from the pre-IT period to the post-IT period. The mean inflation rate falls from 28.06 in the pre-IT period to 13.90 in the post-IT period. This shows a negative relationship between the implementation of inflation targeting and the inflation rate. This is in line with works done by Puni et al. (2014), Coleman (2012), Genc et al. (2007), Hu (2003) and Lin and Ye (2007) who found a negative relationship between inflation targeting and the inflation rate. Volatility of inflation can also be said to have declined over the two periods with the standard deviation falling from 13.14 to 5.10 for the pre-IT and post-IT periods respectively. This is in line with Coleman (2012) who also found a fall in inflation variability for Ghana.

The table shows an increase in the mean GDP growth rate from the pre to the post-IT periods. The mean growth rate increases from 4.71 in the pre-IT period to 7.16 in the post-IT period signifying an increase in the growth rate from the pre-IT to the post-IT periods. This is in line with Ayisi (2013), Abo-Zaid and Tuzemen (2008), Garcia –Solanes and Torrejon-Flores (2009) who found a positive relationship between inflation targeting and the rate of economic growth. Ayisi (2013) is very relevant to this work since his research was conducted on Ghana. The volatility in the growth rate can however be seen to have increased slightly from 1.19 in the pre-IT period to 2.90 in the post-IT period. This is however not in line with Abo-Zaid and Tuzemen (2008) who found a decrease in the volatility of the growth rate in developing countries which had adopted inflation targeting. This can be explained by the fact that growth rate during the pre-IT period ranged between 3 percent and 8 percent while that for the post-IT period ranged between 4 percent and 15 percent.

The mean Real Effective Exchange Rate falls from 184.40 in the pre-IT period to 97.49 in the post-IT period as shown in the table above. This signifies a negative influence of inflation targeting on the exchange rate of the country. A fall in the mean shows that over the years the value of the cedi has been falling compared to other major currencies. This therefore means that the cost of imports is higher for the post-IT period relative to the pre-IT period due to the better performance of the local currency during the pre-IT period. The volatility in the Real Effective Exchange Rate is higher for the pre-IT period compared to that for the post-IT period. There is a massive fall in the volatility of the local currency from 118.58 in the pre-IT period to 6.26 in the post-IT period. Fluctuations in the local currency are lower in the post-IT period compared to the pre-IT period. This is partially in line with Petursson's (2004) work where he found the volatility in the exchange rate falling for 11 out of the 21 countries he sampled.

The mean of the growth in money supply has reduced from the pre to the post-IT periods. This shows that the adoption of inflation targeting has led to the fall in the growth of the money supply, falling from 42.93 in the pre-IT period to 29.99 in the post-IT period. This is expected since the growth in the money supply is a main determinant in Ghana's inflation rate (Gyebi and Boafo,2013). They found a positive relationship between the inflation rate and the money supply. An increase in the money supply will lead to an increase in the inflation rate. As such the implementation of inflation targeting is supposed to have the same effect on both the inflation rate and the money supply. This is evident from the discussion so far. The fluctuation in the growth in the money supply has fallen from 12.95 in the pre-IT period to 7.70 in the post-IT period. The growth in money supply has therefore become more stable after the adoption of inflation targeting.

4.8.2 Results From Independent Sampling Technique

This section shows the results obtained after using the independent sampling technique to find the difference between two population means. Here the two population means refer to the pre and post inflation targeting periods.

Table 3: t values after applying the independent sampling technique

	t-stat	t-critical
Inflation	3.54	2.05
GDP growth	-3.21	2.05
Exchange Rate	2.52	2.05
Growth in Money Supply	3.11	2.05

Source: Computed by Author from data obtained from World Development Indicators, 2015

From the results in Table 6 above, the decision is to reject the null hypothesis of no difference between the two population means for all variables under consideration. The conclusion therefore is that there exists differences between the pre and the post inflation targeting periods. That is there exists a negative relationship between inflation targeting and the inflation rate.

There also exists a positive relationship between inflation targeting and the level of economic growth. The results also mean there exists a negative relationship between inflation targeting and the exchange rate. There also exists a negative relationship between inflation targeting and the growth in money supply.

The results obtained from the independent sampling technique go to back those obtained from the descriptive statistics. That is, it goes to prove that there has been some changes in the macroeconomic variables under consideration since the implementation of inflation targeting.

4.8.3 Results from Stationarity Test

Table 4: Phillips-Perron Unit Root Stationarity Test Results

Variable	Statistic	1%	5%	10%
Inflation Rate	-3.456	-3.723	-2.989	-2.625
GDP Growth	-3.230	-3.723	-2.989	-2.625
Exchange Rate	-12.358	-3.723	-2.989	-2.625
Growth in Money Supply	-3.881	-3.723	-2.989	-2.625

Source: Computed by Author from data obtained from World Development Indicators, 2015

Table 3 above shows the results obtained from the Phillips-Perron stationarity test. From the table, all variables are significant at the 5 percent level of significance. The null hypothesis of the presence of a unit root is rejected since the values for the 't' statistics for the various macroeconomic variables fall within the rejection zone. This paves the way for the study to estimate the VAR model in levels. The results for the appropriate choice of lags are presented below.

4.8.4 Results from Model Selection Test

Table 5: Results from Lag Selection

Lag	SBIC
0	29.7404
1	28.5512***
2	29.8381
3	29.9526
4	30.0045

Source: Computed by Author from data obtained from World Development Indicators, 2015

Table 4 above gives information about the appropriate number of lags to use under the Schwarz-Bayesian Information Criterion (SBIC). From the table, the appropriate number of lags to use given the data, is one lag. The results of the VAR model with one lag are presented below.

4.8.5 Regression Results

This section deals with the discussion of the results obtained from running a regression based on the model specified above. This is meant to prove or disprove what was obtained from the descriptive statistics above. The estimated equations with their standard errors in parenthesis are presented and discussed below.

$$INF_t = \underset{(7.697)}{18.03} + \underset{(0.142)}{0.12}INF_{t-1} - \underset{(0.793)}{0.75}GDP_{t-1} - \underset{(0.019)}{0.04}EXCH_{t-1} + \underset{(0.137)}{0.42}M_{s_{t-1}} - \underset{(4.361)}{10.54}IT \quad \ldots\ldots\ldots\ldots\ldots(8)$$

Equation 8 above shows the results from the inflation equation. The important variable here, is the inflation targeting dummy. The inflation targeting dummy backs what was obtained under the descriptive statistics. The inflation targeting dummy carries a negative coefficient signifying a negative relationship between the adoption of inflation targeting and the inflation rate. This relationship is statistically significant with a p-value of 0.016. Though the inflation rate does not reduce to the optimal levels of between zero and two percent suggested by proponents of inflation targeting, it conforms to theory.

This is also consistent with the main aim of implementing inflation targeting, that is, inflation targeting places price stability as the main objective of the central bank and does all to try and achieve this stability. The results are consistent with work done by Puni et al. (2014) who also found a negative relationship between inflation targeting and the inflation rate in Ghana. Coleman (2012) also found a negative relationship between inflation targeting and the rate of inflation in Ghana. Hu (2003) found a large reduction in inflation in 51 countries due to the adoption of inflation targeting in those countries.

$$GDP_t = \underset{(1.650)}{4.19} - \underset{(0.030)}{0.01}INF_{t-1} + \underset{(0.170)}{0.26}GDP_{t-1} + \underset{(0.004)}{0.001}EXCH_{t-1} - \underset{(0.029)}{0.02}M_{s_{t-1}} + \underset{(0.935)}{1.91}IT \quad \ldots\ldots\ldots\ldots(9)$$

Equation 9 above presents the results for the GDP growth equation. The inflation targeting dummy carries a positive coefficient signifying a positive influence of inflation targeting on the real GDP growth rate. This relationship is significant with a p-value of 0.041. The inflation targeting dummy backs what was obtained under the descriptive statistics.

This is in line with work done by Ayisi (2013) who found a positive and significant relationship between inflation targeting and GDP growth in Ghana. Abo-Zaid and Tuzemen (2008) found a positive relationship between inflation targeting and the growth rate for both developing and developed inflation targeting countries. Garcia –Solanes and Torrejon-Flores (2009) also found a positive relationship between inflation targeting and the growth rate in Brazil, Columbia and Peru.

$$EXCH_t = \underset{(10.988)}{29.81} + \underset{(0.202)}{0.71}INF_{t-1} + \underset{(1.132)}{0.29}GDP_{t-1} + \underset{(0.026)}{0.60}EXCH_{t-1} - \underset{(0.196)}{0.06}M_{s_{t-1}} - \underset{(6.226)}{2.26}IT \quad \ldots\ldots\ldots\ldots (10)$$

Regression results for the exchange rate variable are shown in equation 10 above. The inflation targeting dummy carries a negative coefficient signifying a negative impact of inflation targeting on the exchange rate. The local currency has performed poorly since the implementation of inflation targeting. This relationship is however not statistically significant with a p-value of 0.716. Edwards (2006) also found an insignificant relationship between inflation targeting and the exchange rate. Though the relationship in Ghana is not significant, the direction of movement conforms to Petursson (2004), who found a negative relationship between inflation targeting and the exchange rate in developing countries.

The insignificance of the relationship however signals that the negative relationship between inflation targeting and the exchange rate may not necessarily hold. Theoretically, inflation and the exchange rate are related negatively and so a fall in the inflation rate through inflation targeting as discussed above, should lead a strengthening of the local currency. However, Mumuni and Owusu-Afriyie (2004) argue that, apart from the inflation rate which influences the level of the exchange rate in Ghana, speculation and the treasury bill rate are major determinants of the exchange rate in

Ghana. This could explain the reason for the depreciation of the local currency though the inflation rate has fallen from the pre to the post inflation targeting eras.

$$M_{s_t} = \underset{(9.976)}{38.30} + \underset{(0.184)}{0.23}INF_{t-1} - \underset{(1.028)}{0.65}GDP_{t-1} + \underset{(0.024)}{0.02}EXCH_{t-1} + \underset{(0.178)}{0.06}M_{s_{t-1}} - \underset{(5.652)}{8.19}IT \quad \ldots\ldots\ldots\ldots\ldots (11)$$

Equation 11 above shows the results obtained for the growth in money supply variable. The results show a negative relationship between inflation targeting and the growth in money supply. That is, the implementation of inflation targeting should see the reduction in the growth of the money supply in Ghana. The monetarists believe that inflation is caused by excess money supply and so if inflation is reducing through the implementation of inflation targeting, the growth in money supply is also expected to move in the same direction. This is the case in this work. However the negative coefficient on the inflation targeting dummy is not statistically significant with a p-value of 0.148 meaning that the implementation of inflation targeting in Ghana does not necessarily lead to a fall in the growth in money supply.

4.8.6 Results from Serial Correlation Test

Table 6: Results from the Breusch-Godfrey Lagrange Multiplier (LM) test for serial correlation.

Lag	chi2	p-value
1	14.5080	0.56093

Source: Computed by Author from data obtained from World Development Indicators, 2015

Based on the p-value from table 5 above, the study fails to reject the null hypothesis of no first order serial correlation. The conclusion therefore is that there is no presence of serial correlation. The error terms from different periods are not correlated. The estimates can therefore be said to be efficient.

CHAPTER FIVE

CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Summary and Conclusion

This work looked at both the theoretical and the empirical aspects of inflation targeting. The theoretical aspect dealt with inflation targeting around the world while the empirical aspect focused mostly on Ghana. The paper first gave a theoretical background to inflation targeting and then empirically analyzed its effects on some selected macroeconomic variables in Ghana as far as monetary policy and its goals are concerned. The macroeconomic variables which were looked at are the rate of inflation, the GDP growth rate, the exchange rate and the growth in money supply. The study covered a total period of thirty years from 1984 to 2013. The total time period was further divided into the pre-inflation targeting period and the post-inflation targeting period. The pre-inflation targeting period was a total of 18 years while the post-inflation targeting period covered a total of 12 years.

Chapter two was the literature review of the work. This gave a thorough review of literature on inflation targeting as a framework for conducting monetary policy. This chapter was divided into two parts. The first part gave a theoretical background to the conduct of inflation targeting while the second part reviewed empirical literature on inflation targeting and how it has performed as a monetary policy. This was followed by chapter three which talked about the monetary processes in Ghana. It gave a background to inflation in Ghana and the various monetary policies that have been implemented over the years to help check inflation which happens to be the main goal of monetary policy.

Chapter four of this work dealt with the methodology and analysis of the work. The methodology handles the econometric modelling of the work and the gives an idea as to how the analyses will be handled. The analysis is the next part. This part was carried out in three stages in line with the specifications of the methodology. The first stage used descriptive statistics in analyzing the impact of inflation targeting on the various macroeconomic variables discussed earlier in this work. The study found that the performance of three out of the four variables had improved since the implementation of the inflation targeting monetary policy. The inflation rate and inflation variability fell after the implementation of inflation targeting. The GDP growth rate also performed better after the adoption of inflation targeting. The growth in money supply also fell after inflation targeting was adopted. The exchange rate however performed poorly after the implementation of inflation targeting. This suggested that the implementation of inflation targeting had been beneficial to Ghana though this test is statistically not strong.

The second stage used an independent sampling technique for small samples to help prove whether a change had really occurred in the variables under discussion. This was done by finding out whether a significant relationship existed between the means of the pre and those of the post inflation targeting periods. The t-test confirmed what was obtained under the descriptive statistics. That is, there existed a difference between the means of the pre inflation targeting era and that of the post inflation targeting era. This confirmed that inflation targeting has had an impact on the macroeconomic variables under consideration.

The study then used regression analysis to prove or disprove what had been obtained under both the descriptive statistics stage and what had been obtained under the independent sampling technique stage. It investigated what kind of relationship existed between inflation targeting and the various macroeconomic variables under consideration. The regression analysis reinforced what

was obtained under the descriptive statistics and the independent sampling stages. That is, there has been a change in the various macroeconomic variables since the implementation of inflation targeting. Inflation targeting has had a negative and statistically significant impact on the inflation rate. There also exists a positive and significant relationship between inflation targeting and economic growth in Ghana. Inflation targeting has a negative but statistically insignificant relationship with the growth in money supply and the exchange rate. Though they are not significant, the relationships that exist between these two variables and inflation targeting is what is observed practically in the country.

This study goes to prove theoretically and empirically studies that have been carried out on inflation targeting. That is inflation targeting has had an impact, mostly desirable on macroeconomic variables since its adoption. The most important impact being the one it has on the inflation rate. This is the main objective of inflation targeting. To keep the price level stable which provides a conducive atmosphere for the other macroeconomic variables to also improve.

5.2 Policy Recommendations

Like any other policy, inflation targeting as a monetary policy was not welcomed by all when it was first introduced. It has been through intense debate about how applicable it is for the Ghanaian economy. As such, there was the need to undertake such a study to analyze the impact of such a monetary policy on the Ghanaian economy. Little work has also been done in this area especially in Ghana and hence the need for such a study. The policy implications of what has been discussed are as follows.

The main aim of a monetary policy is to maintain stable prices and since inflation targeting has achieved this by reducing the inflation rate and the volatility of inflation, the use of inflation targeting should not be truncated but further developed with higher goals set and efforts made to achieve those set goals. The level of inflation though it has reduced over the years seems to still be high compared to the theoretical levels of optimal inflation rates. These high inflation rates are mostly caused by fluctuations of crude oil prices on the international market and high fiscal deficits which have to be financed one way or the other. The monetary authorities need to put in place mechanisms that will counter these problems. This will enhance the ability of inflation targeting in anchoring the expectations of the people. When people also see the monetary authority putting in place these mechanisms, they will get more confidence in the authority and their efforts in maintaining stable prices. This will further enhance the performance of inflation targeting in achieving its goals. Other works can also investigate how best the monetary authority can accommodate some of these shocks which affect the price stability and find how best to manage them.

Further research may have to be conducted under inflation targeting, especially its impact on other macroeconomic variables in Ghana. This is necessary considering how young the adoption of inflation targeting in Ghana is and how few years' worth of data there is for the post inflation targeting period. The statistical insignificance of the variables other than the inflation rate and the GDP growth rate may be the reason why most studies conducted on the impact of inflation targeting on macroeconomic variables have been limited to its impact on the inflation rate and the GDP growth.

This study has also shown that there has been an increase in the GDP growth rate and a fall in its volatility in Ghana since the adoption of inflation targeting compared to when the country was using the monetary aggregates targeting monetary policy. This goes to show that the adoption of inflation targeting increases the GDP growth in the country. This is a plus for inflation targeting and efforts should be made to continue with this monetary policy to achieve greater economic growth levels.

There has also been a fall in the growth in money supply in Ghana from the study conducted so far. Though this was slightly insignificant, the actual figures in the growth in money supply shows a fall in the growth rates. This is expected as one major determinant of inflation is the growth in money supply and so if inflation rates are falling, one would also expect the growth in money supply to also fall. This calls for the continuation of inflation targeting, since its adoption has reduced one of Ghana's main causes of inflation.

The study showed a fall in the exchange rate variable since the adoption of inflation targeting. The Real Effective Exchange Rate was used in the study. A fall in the Real Effective Exchange Rate signifies a fall in the value of the Ghanaian cedi since the implementation of inflation targeting. This leads to an increase in the prices of foreign goods relative to local goods. One may argue that this helps Ghana since its exports will become competitive on the international market and Ghana may end up exporting more goods to other countries and earn foreign currency. However the other side of this argument is that Ghana imports more than it exports, and so Ghana ends up losing more than it benefits from the depreciation of the local currency. And besides, Ghana exports mostly raw materials which are also cheaper compared to the finished goods we import. This may also put pressure on the inflation rate as we may be importing inflation from other countries. The monetary authorities therefore need to put in place mechanisms to help check the declining value

of the cedi. A falling cedi may affect inflation in Ghana thereby defeating the price stability goal of inflation targeting. Ghana will benefit more from a cedi that has a higher value than one which has a lower value relative to other major trading currencies.

In totality, this work has tried to analyze the impact of inflation targeting on some macroeconomic variables in Ghana. Though inflation targeting has not been around for a very long time compared to other countries, the evidence from the analysis is generally encouraging. The work so far has shown that the implementation of inflation targeting has brought with it a reduction in the rate and volatility of inflation, an increase in economic growth and a reduction in the growth in money supply signaling improved performances in these variables compared to the pre inflation targeting period.

This makes it appealing to many emerging economies who hitherto experienced very high rates of inflation and inflation volatility, and had dwindling central bank credibility for their various central banks. No wonder no country has walked away from this monetary policy after adopting it.

This does not mean that inflation targeting is a perfect monetary policy and does not face any challenges. A major problem facing monetary policy in Ghana is shocks usually from the external sector. These shocks are mostly from fluctuations in crude oil prices on the international market which mostly translates into higher inflation levels locally. This makes the conduct of monetary policy difficult for the monetary authorities who do not have direct control over such shocks. This also affects the credibility of the central bank who are most likely to miss their targets.

There is also one huge challenge of further developing the inflation targeting framework. This includes making the monetary authority more accountable for its actions when it comes to the

conduct of monetary policy in Ghana. There is also the need to further educate people on the workings of inflation targeting and what to expect from such a monetary policy.

Though there is a consensus between the government and the central bank that price stability is very important for the development of the economy, there does not seem to be any effort between these two to work at achieving this goal. This is needed if inflation targeting is to succeed.

The study thus serves as a point from which further works on inflation targeting can be undertaken. Especially with regards to other macroeconomic variables that are important for the Ghanaian economy. Inflation targeting may improve or worsen after some years and so there is the need for further work in this area as time goes on.

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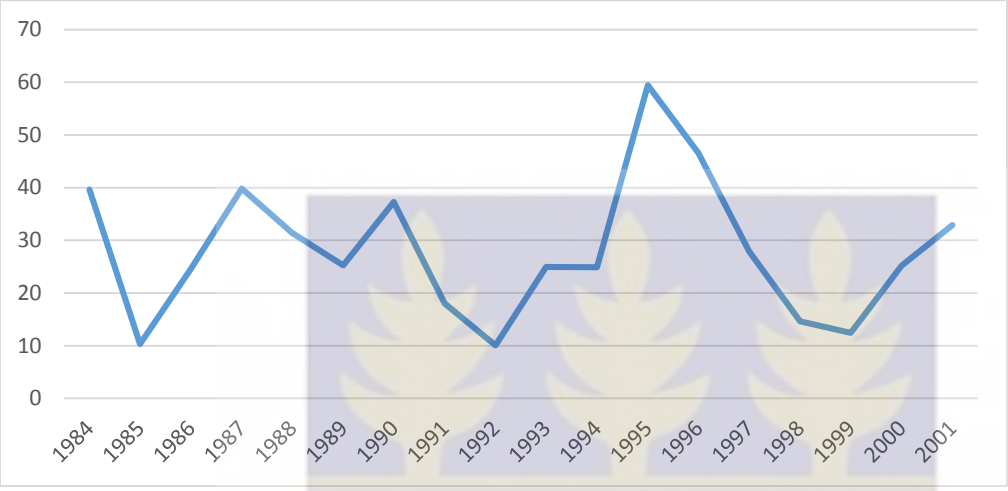
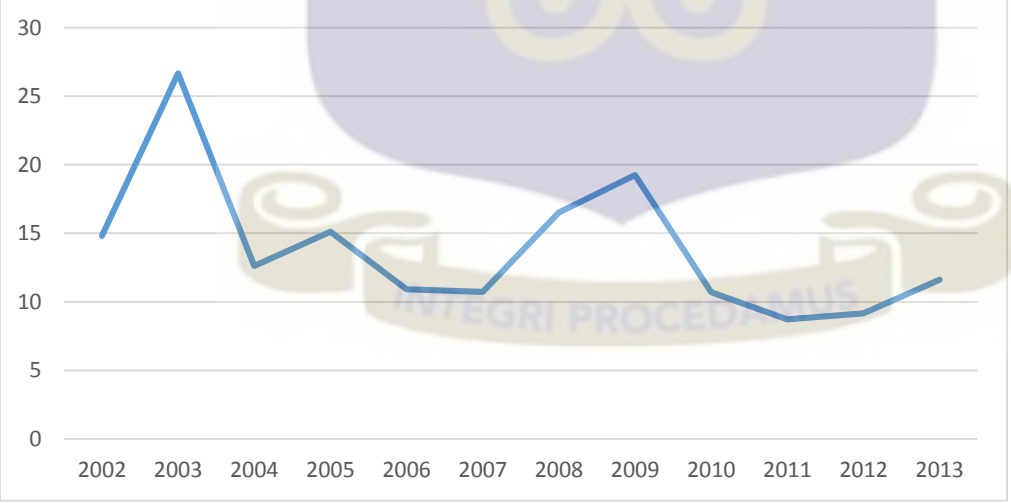
APPENDIX

Series of Macroeconomic Variables

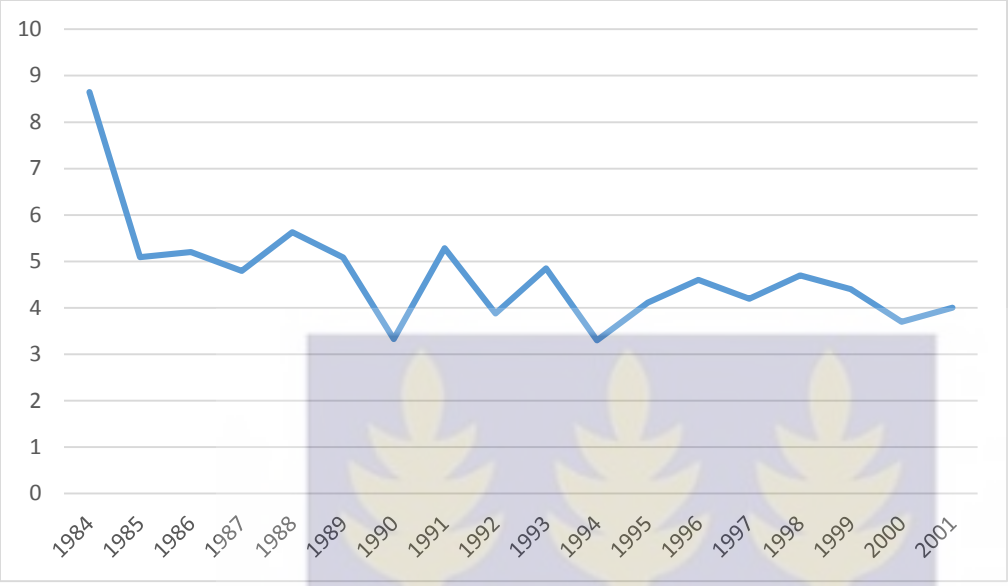
Pre-IT Inflation



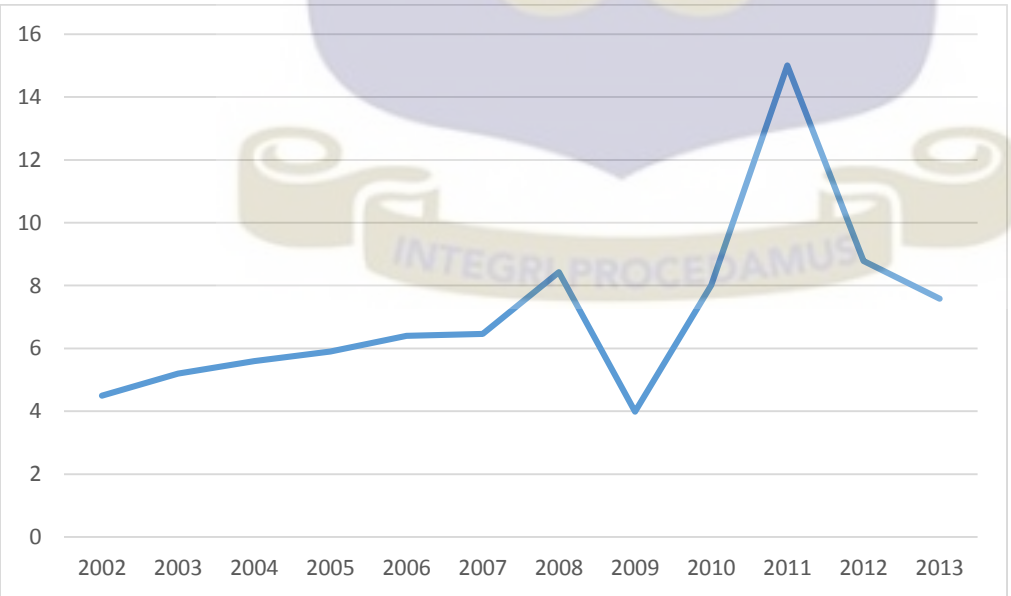
Post-IT Inflation



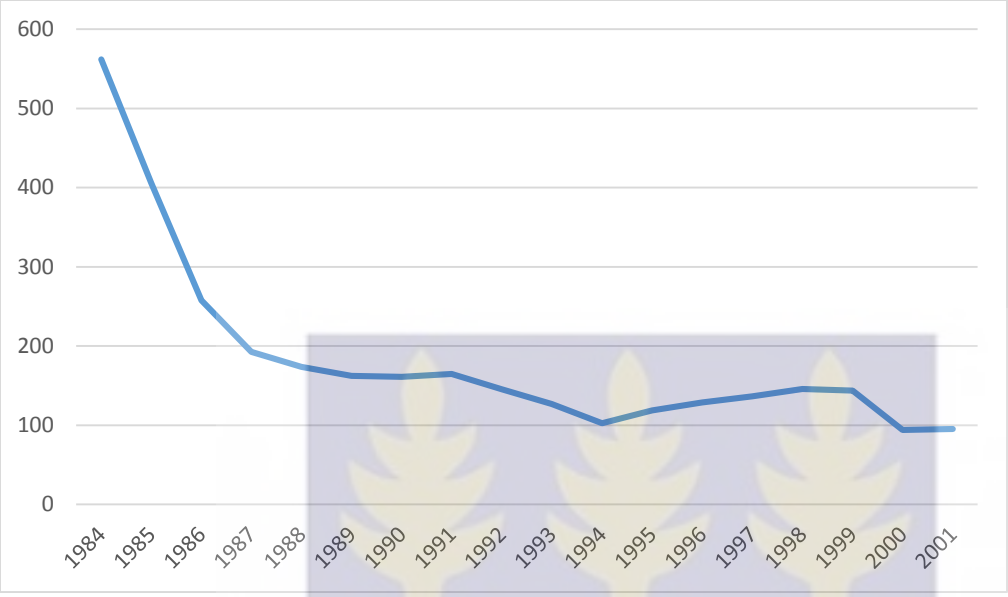
Pre-IT GDP Growth



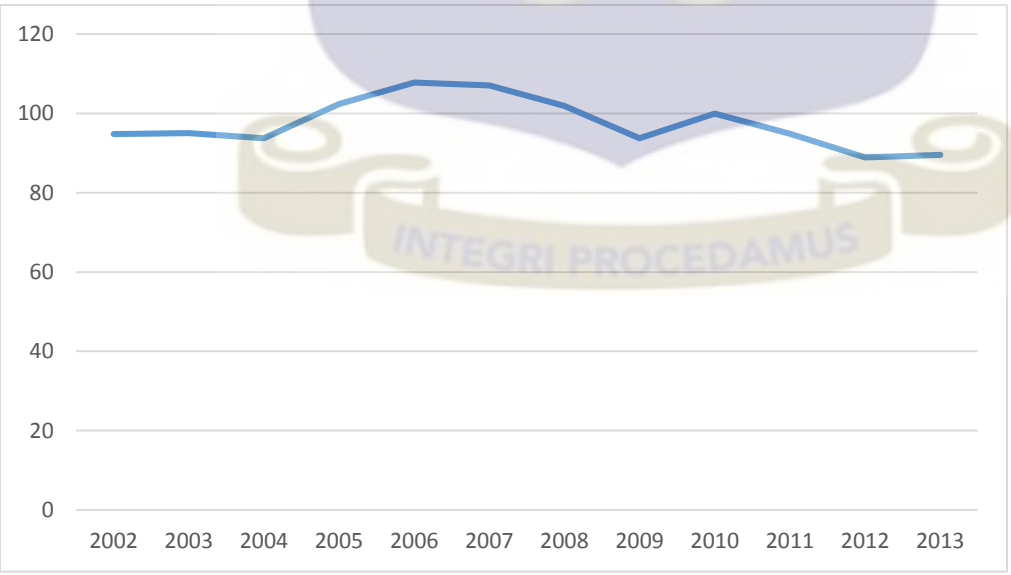
Post-IT GDP Growth



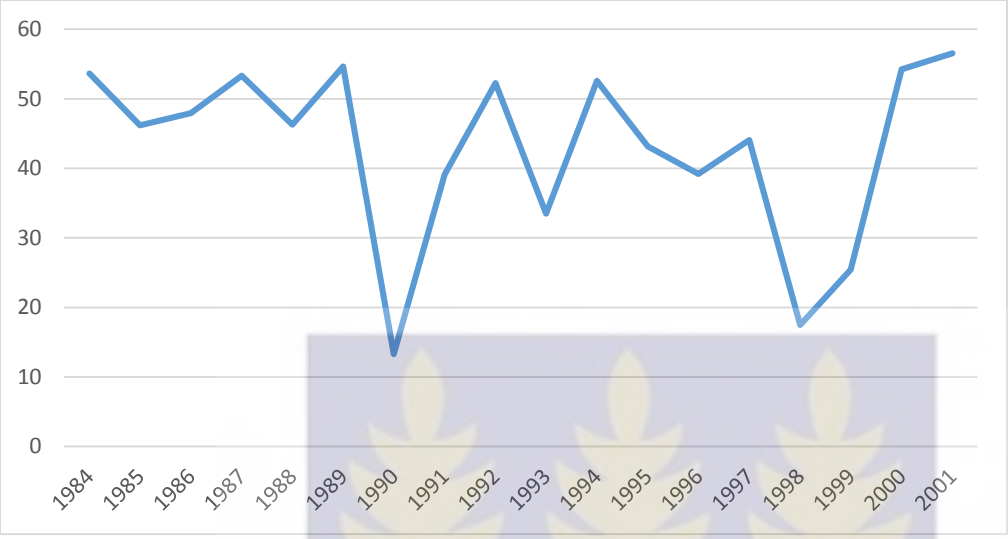
Pre-IT Exchange Rate



Post-IT Exchange Rate



Pre-IT Money Supply



Post-IT Money Supply