The Impact of Money Supply on Inflation, A Case of Ghana

Collins Frimpong Ofori\textsuperscript{1}, Benjamin Adjei Danquah\textsuperscript{2}, Xuegong Zhang\textsuperscript{3}
\textsuperscript{1,3}School of Economics, Huazhong University of Science and Technology, Wuhan, China
\textsuperscript{2}School of Economics, Wuhan University of Technology, Wuhan, China.

Abstract: This study examines the impact of money supply on inflation in Ghana. Annual data from 1967-2015 were used to estimate the model. The study is limited to the use of money supply as independent variable on the dependent variable which is inflation. In Ghana, the Bank of Ghana is responsible for controlling money supply. The results showed a long-run positive relationship between money supply and inflation based on an Ordinary Least Squares.

1. Introduction

There are different ways of defining inflation by many economists in various disciplines but there seem to be a common theme established across all. Economists agree that inflation is a rise in general price level. Pigou (1947) reconciles this fact by defining inflation as the continuing or persistent tendency for the price level to rise. Inflation can also be defined as persistent and appreciable increase in the general price level. This may be one of the most familiar words in economics (Ackley, 1960). Inflation is typically a broad measure, such as the overall increase in prices or the increase in the cost of living in a country. McMahon (2007) defined it as an increase in the price a person pays for goods, while Amadeo (2012) cited it as when the prices of most goods and services continue to creep upward. When this happens, the standard of living falls. The most widely accepted school of thought on inflation is that it is a monetary phenomenon; hence the reduction of inflation is largely the purview of monetary policy. This school of thought, based on the quantity theory of money, posits that inflation is determined solely by the change in the relative supply of money and goods. The economic and financial situation of a country is largely based on the monetary policy being implemented by the Central Bank of that country. It is widely agreed that monetary policy can contribute to sustainable growth by maintaining price stability. According to Christiano & Fitzgerald (2003), when the rate of inflation is sufficiently low households and businesses do not have to take into account price fluctuations when making everyday decisions.

When the general price level rises, each unit of currency buys fewer goods and services. Consequently, inflation reflects a reduction in the purchasing power per unit of money, that is, a loss of real value in the medium of exchange and unit of account within the economy. In many countries it is common to use an index based on a collection of prices of consumer goods such as the consumer price index (CPI). Inflation's effects on an economy are various and can be simultaneously positive and negative. Negative effects of inflation include an increase in the opportunity cost of holding money, uncertainty over future inflation which may discourage investment and savings, and if inflation were rapid enough, shortages of goods as consumers begin hoarding out of concern that prices would increase in the future. Positive effects include ensuring that central banks can adjust real interest rates (to mitigate recessions) and encouraging investment in non-monetary capital projects. Economists generally believe that high rates of inflation and hyperinflation are caused by an excessive growth of the money supply. In economics, the money supply or money stock is the total amount of monetary assets available in an economy at a specific time. This series, frequently referred to as M1 is a narrower definition of money than M2. M2 includes M1 plus short-term time deposits in banks and 24-hour money market funds.

Monetary theory provides insight into how to craft optimal monetary policy, this is referred to as either being expansionary or contractionary, where an expansionary policy increases the total supply of money in the economy more rapidly than usual, and contractionary policy expands the money supply more slowly than usual or even shrinks it (Lipsey et al., 2001). However, money supply growth does not necessarily cause inflation. Views on which factors determine low to moderate rates of inflation are more varied. Low or moderate inflation may be attributed to fluctuations in real demand for goods and services, or changes in available supplies such as during scarcities. However, the consensus view is that a long sustained period of inflation is caused by money supply growing faster than the rate of economic growth.
Today, most economists favour a low and steady rate of inflation. The task of keeping the rate of inflation low and stable is usually given to monetary authorities. Generally, these monetary authorities are the central banks that control monetary policy through the setting of interest rates, through open market operations, and through the setting of banking reserve requirements. The economy is a collection of millions of individual consumers and firms interacting on a daily basis to determine which goods and services would be produced, which firms would supply various products, which consumers would take them home at the end of the day, and what prices would be paid for the many different products.

The economic history of Ghana has been marked by conscious and intensive efforts by successive governments to speed up economic development. The period from 1957–1972 is classified as the first episode of inflationary situation in Ghana, which was marked by active involvement of the state in economic activity of the country. Almost all the industrial set-up and the infrastructure base of the country were financed by the state. The gradual but increasing inflation rate became serious during the period 1973 to 1982, which is the second episode of inflation in Ghana. Within this period, the various military leaders who came into power pursued expansionary economic management, which led to huge Balance of Payment (BoP) deficits. The BoP deficits that resulted were financed through expansionary monetary policy, which resulted in increases in money supply and the subsequent effects on the economy through high general price levels. By 1983, inflation had reached a “sky-rocketing” level of 123 % (Bemanke et al, 2005).

The control of inflation is central to good monetary policy. The concern with inflation emanates not only from the need to maintain overall macroeconomic stability, but also from the fact that inflation hits the poor particularly hard as they do not possess effective inflation hedges. In the short to medium term, high inflation and persistent inflation undermines public confidence in the economy and in the management of economic policy generally, with potentially adverse effects on risk-taking, investment, and other productive activities that are sensitive to the public’s assessments of the prospects for future economic stability. In the long term, low inflation promotes growth, efficiency, and stability, which supports maximum sustainable economic growth. Evidently inflation in Ghana is caused by both fiscal and non-monetary factors. In the past, Ghana’s Balance of Payment position has been in severe difficulties due to inappropriate trade, fiscal and monetary policies. Excessive money supply is the single most pervasive cause of inflation in Ghana. (Bemanke et al, 2005).

2. Literature review

This section of the study reviews previous works that are related to the subject matter; the impact of money supply on inflation. The monetarist theory of inflation that was proposed by Milton Friedman and other economists is discussed. The structural theory of inflation that was propounded by some economists is also examined. Another theory of inflation which is the Keynesian theory is thoroughly discussed for the readers to appreciate the various efforts that have been made in studying inflation. The expansionary, as well as the contractionary monetary policies that are used by central banks to regulate the amount of money in circulation is also discussed. The history of monetary management in Ghana is further examined. Studies on inflation and money supply within the Ghanaian economy as well as the Granger-causality test are elaborately examined in this section.

Lawson (1966) noted that the major contributory factor to the inflationary process was deficit incurred on government accounts and which were financed through borrowing from the domestic banking system. This assertion confirms the monetarist hypothesis. She also stated that inflation was further strengthened by the shortage of essential consumer goods and restrictions of imports which have abort as a result of structural rigidities in the country. The findings of a study carried out by Ahmad (1970) for the period 1960 to 1965 confirmed Lawson’s study over the same period. Ahmad (1970) also noted that excessive monetary expansion arising from government borrowing from the banking system to finance budget deficits generated strong inflationary pressures in the country. Kwakyes’ work also established that deficiency in local food production is a contributing factor to the general inflation pressures. This also can confirm further results of various studies on Ghana’s inflation as well as the structuralist paradigm that food supply constraint plays a major role in price inflation in LDCs. He blamed this on increasing demand on agricultural production resulting from growth in population and urbanization. Growth in productivity was undermined by bottlenecks in that sector and therefore could not match the population growth and urbanization in terms of food demand. This excess demand for food then influenced comprehensive price increases. Empirical evidences on Ghana’s economy indicate that money supply has played a very significant role in price movements in the country. For instance, conclusions from the works of Lawson, Ahmed, Ewusi & Kwakye attributed the Ghanaian inflation predominantly to excessive monetary expansion which resulted from government borrowing from the banking system to finance budget deficits. According to the bank of Ghana (BOG), the financial support from the BOG to the central government in its
expansionary fiscal policies occasioned money supply to rise on the average at 40% per annum.

**A. The Development of the Monetary Policy Frameworks in Ghana**

The history of monetary management in Ghana can be categorized into two main distinct phases; the period associated with monetary controls and the period under which monetary policy has been allowed to develop in a setting of a liberalized environment. Prior to 1983, when major reforms in the financial structure of the economy began, the Bank of Ghana operated largely a direct controlled system of monetary management. This entailed the reliance on predominantly direct intervention instruments, prominent among which was direct credit control. This involved the imposition of ceilings, both global and sectoral, on individual commercial banks' lending and had to be consistent with national macroeconomic targets like growth, inflation and external balance. With time these arrangements proved to be ineffective and introduced inefficiencies in various sectors of the economy. These weaknesses inherent in the economy at the time necessitated reforms in the conduct of monetary policy. The direct control system of monetary management had to be abandoned with the advent of liberalization of the economy in 1983.

The liberalization process entailed progressive deregulatory measures, culminating in the institutionalization of a market based system of monetary management in early 1992 and focused largely on the use of indirect and market based instruments in the conduct of its monetary policy. This brought into focus a new dimension to the way monetary management was designed and implemented. In 2002, the Bank of Ghana Law, Act 2002 was passed by parliament. The Law gave the Bank of Ghana the independence in the discharge of its monetary policy. The independence aspect of the law implied that the Bank could use whatever tools available at its disposal in achieving its primary objective of price stability. The Law gave birth to the Monetary Policy Committee (MPC). Conduct of Monetary Policy vested in the MPC. The law foresaw the Bank of Ghana to be an inflation-targeting central bank. The Monetary Policy Committee since 2002 has been putting in place various institutional, operational as well as accountability and transparency structures to facilitate the effective discharge of its functions.

**B. Review of related studies**

Rolnick and Weber (1994) examined the behavior of money, inflation, and output under fiat and commodity standards for 15 countries. They found that under fiat standards, the growth rates of various monetary aggregates are more highly correlated with inflation and with each other than they are under commodity standards. McCandless and Weber (1995) found in 110 Organization for Economic Cooperation and Development (OECD) countries over a 30-year period that growth rates of the money supply and the general price level are highly correlated. They explained that the correlation between money growth and inflation being close to one implies that long-run inflation can be adjusted by adjusting the growth rate of money. Dwyer (2001) investigated the strength of money supply in predicting inflation using VAR on quarterly data from 1953 to 1997. The study concluded that real income growth, inflation or both are related to money growth and that money growth is more useful for forecasting inflation than other variables besides past inflation.

Evidently inflation in Ghana is caused by both fiscal and non-monetary factors. In the past, Ghana’s balance of payment position has been in severe difficulties due to inappropriate trade, fiscal and monetary policies. Excessive money supply is the single most pervasive cause of inflation in Ghana. For instance between 1996 and 1997 inflation was at 25% and 8% respectively, but this was short lived as it shot to 40.5% in December 2000, reflecting fiscal mismanagement. Bemanke et al. (2005). A non-monetary source of inflation is attributable to poor performance of the agricultural sector between 1995 and 1999. Ghana’s agricultural sector grew by 44 percent but dropped again to 1.1 percent in the year 2000. This resulted in high food prices in the country. Food prices alone account for over half of the average household expenditure in Ghana. The other dimension to inflationary trends is that inflation is international. This is because Ghana like the rest of the world is always affected by crude oil hikes, which affects the state of the economy. This has been a major cause of civil strife which belies every military overthrown in the country. For example high inflation rate of 100% in 1979 moderating to 54% led to the removal of the then government from office in a military putsch in 1981. The then government imposed fiscal and monetary discipline to curb it, but spending unwisely during the 2000 election year shot inflation from 8 percent to 30 percent between 1998 and 2000. The new government succeeded in curbing inflation down but again shot up during the 2008 election year from 12.81 percent in January 2008 to 18.4 percent in July 2008. Currently, inflation is still unstable and has assumed a downward decreasing trend from 14.78 percent in January to 14.23 percent in February; it further decreased from 14.23 percent in February to 13.32 percent in March, 2010. Inflation has further dropped from 13.32 percent in March to an unprecedented value of 11.66 percent in April, representing a drop of 1.7 percent. Recently the inflation rate for July 2010 is 9.46 percent. During the past three decades, dramatic changes in the inflationary environment have stimulated wealth...
of studies on the relative accuracy of alternative models of inflation forecasts. Moreover, there has been much work on examining and evaluating different methodologies in forecasting inflation.

A number of research conducted have brought to light a wide range of factors explaining inflationary pressure. Economists contend that there is no single theory capable of explaining every inflationary situation in an economy because; source of inflation will depend on a number of factors including the extent of development of a country, the nature of its labour unions, market structure and the likes. Therefore what might appear a reasonable paradigm for a situation may be unsuitable for another. Government expenditure and revenue is raised by inflation. It causes an upward adjustment in government’s budget, especially index-linked ones while it simultaneously increases government revenue. Budgetary imbalances have become entrenched and have been the primary cause of resurgence of macroeconomic instability. For example, according to (CEPA, 2001) the non-observance of poverty reduction and growth facility (PRGF) conditionality’s agreed with the international monetary fund (IMF), worsened the state of the economy in 1999 and 2000 fiscal year, as there was total delayance in aid disbursement to the country. Bank of Ghana in an attempt to maintain its monetary targets often resulted to bouncing of government cheques. The consequential borrowing by government led to a sharp buildup of the banking sector as private sector operatives turned to the banking system for an ace on account of looked up working capital, in spite of enormous interest rates.

C. Inflation and money supply

Bawumia & Abradu (2003) indicated that the empirical evidence of a broad monetary growth in Ghana between the period of 1983 and 1999 is suggestive, as theory will predict that a slower money supply growth reduces inflation and the rate of depreciation of the cedi. They then considered the monetary growth trends between the periods of 1983 and 1999 and indicated that broad monetary growth peaked at 62.5 percent in 1985. Thereafter, the pursuit of a tight monetary policy resulted in broad money growth reducing inflation to 20.6 percent by 1990. Over the period of 1983 to 1991 inflation declined from a peak of 122.8 percent in 1983 to 10.2 percent by 1991, whilst monetary growth was 26 percent in 1991. Exchange rate over this period also declined from 93 percent in 1983 to 11.54 percent by 1991. According to the Ghana macroeconomic preview, (CEPA, 2001), it is noted that the difficulties encountered in the divestiture program deepened the deficit in government budget as net foreign financing declined from 26 percent of GDP in 1998 to 0.9 of GDP in 1995. Net domestic finance also rose from 5 percent of GDP in 1998 to 7 percent of GDP in 1999 and sharply to 10.3 percent.

Considering the long-run inflation when the money stock in the economy increases by 1%, the inflation rate will also increase by 15.72% which clearly confirm the monetarist argument. This result reflects the fact that the monetary authorities exogenously determine money supply in Ghana. Besides due to the lack of independence of the central bank (Bank of Ghana), money supply and the policies that govern it are based on the discretion of the government in power but not on rules. Niccolleta and Edward (2001), updates and extends Friedman’s (1972) evidence on the lag between monetary policy actions and the response of inflation. Their evidence is based on UK and US data for the period 1953 to 2001 on money growth rates, inflation and interest rates, as well as annual data on money growth and inflation. Their findings reaffirm the result that it takes over a year before monetary policy actions have their peak effect on inflation. Tyrkalo and Adamyk (1999) and Doroshenko (2001), consider relations between both money supply and inflation and between money supply and GDP. Their findings confirm a long-run relationship between money growth and inflation. The period of money expansion and high inflation in the decade of the 1990’s was accompanied by contraction of output. Novoseletska (2004) also discusses this issues taking note of the break point in the statistical relationship. In a more recent period of financial stability (1999-2003) rising monetary aggregate were accompanied by falling inflation and a rebound of output. Novoseletska and Myhaylychenko (2004), note that nominal exchange rate stability could contribute to moderate growth rates of prices during the last few years.

A similar model was employed for Ghana by Chibber & Shafik (1990) covering 1965 to 1988. Their results suggest that growth in money supply is one principal variable that explains the Ghanaian inflationary process. Such variables as official exchange rate and real wages could only exert negligible influence on inflation. However, significant positive relationship was found between the parallel market exchange rate and the general price level. Probably motivated by the findings of Chibber & Shafik (1990), Sowa & Kwakye (1993) also undertook a study of inflationary trends and control in Ghana. A simple model was employed to determine the relative effects of monetary factors and structural elements on the general price level. Their results indicate that monetary expansion exerted little influence on inflation.
3. Research methodology

Model Specification

The simple regression model is adopted for this study with Inflation and Money supply as variables, the dependent and independent variables:

Below is the econometric model:

\[ Y_t = \beta_0 + \beta_1 X_t + \epsilon_t \]

The Money Supply \((X_t)\) is the independent variable with Inflation rates \((Y_t)\) as the dependent variable. \(\epsilon_t\) represent all omitted variables from the model and also the random errors from the process of estimation. The assumption of the error term is in accordance to Ordinary Least Square (OLS) assumption to be distributed in zero mean and constant variance. \(\beta_0, \beta_1\) are the parameters of elasticity.

Research Hypothesis

\(H_0\): null hypothesis - That money supply has no significant impact on inflation (We reject \(H_0\); if there is a significant impact)

\(H_1\): alternative hypothesis - That money supply has significant impact on inflation (We do not reject \(H_0\); if there is a significant impact)

FIGURE 1 Analysis of trend of Ghana’s inflation (1967 - 2015)

The highest inflation rate of 123.06% was recorded in 1983 and the lowest of -3.88% in 1967. 21.77% points of standard deviation and 27.21% points of mean Inflation shows how the values from the mean are being spread over the period of this study. It also shows a positive skewness of 2.18%.

Money Supply Growth

Money supply, being the key instrument in which the Central Banks employ in an attempt to control rates of inflation. The trend of Ghana’s money supply shows a high rate of 68.52% as money supply recorded in the year 1978. The lowest money supply growth rate of 1.23% was recorded in 1967. Standard deviation of 15.48% points and 34.54% points of mean money supply shows how the values from the mean are being spread over the period of this study. It shows a leftward and a negative skewness of -0.06%.

FIGURE 3 Combined Analysis of trend of Ghana’s Inflation and Money Supply (1967 - 2015)
success of the current inflation policy known as inflation targeting practiced by countries like United Kingdom and Sweden which places great importance on the independence of the central bank re-enforces the point in relation to the independence of the Bank.

5. References


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Hypothesis Testing

The tabulated t-value at 5% significance level and a 47(n-k) degree of freedom is 2.01, whereas the calculated value (T-statistics) for Money supply is 4.02. From the outcome of the regression, $\beta_1 X = 4.02$ for a 5% level test and with n-2=47 degrees of freedom, the critical value 2.01 is lesser than the t-value of 4.02. Therefore we reject the $H_0$: null hypothesis.

The t-value for Money supply is greater than the tabulated value, it can be concluded that money supply has significant impact on inflation, therefore we reject $H_0$: null hypothesis.

Therefore we accept the $H_1$: alternative hypothesis - That money supply has significant impact on inflation.

4. Conclusion

The main aim of this study was to establish the relationship between money supply and inflation by reviewing relevant studies using Ghana as the reference country. Again, it was established in literature that the macroeconomic determinants of inflation in Ghana. It is clear that the growth rate of real GDP and the growth of money supply are the main determinants of inflation in Ghana- both in the long-run and the short-run, with money supply being the key determinant. The coefficient for money supply from the estimated long-run inflation function confirms the Monetarists theory of inflation in the long-run. Base on the estimated result, the independence of the central bank is very important if policy makers want to reduce the effects of money supply on inflation. The independence of the Bank of Ghana will help check discretionary monetary practices such as financing of government debt by the central bank via printing of currency. Besides, the