

**CERTIFICATION**

The undersigned certify that they have read and hereby recommend for acceptance by the Open University of Tanzania as a dissertation entitled: *The Budget Deficits and Inflation in Tanzania: A causal relationship*, in partial fulfillment of the requirements for the degree of Master of Science (Economics) of the Open University of Tanzania.

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Date: .....

**DECLARATION**

I **Niwael Mmbaga**, declare that this dissertation is my own work and that it has not been presented and will not be presented to other University for a similar or any other degree award.

Signature.....

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**DEDICATION**

This dissertation is dedicated to my husband Gerald Mollel and my son Godson Gerald Mollel, and my friends who have been part of my academic excellence.

## ABSTRACT

The existing high levels of inflation along with budget deficits in Tanzania have created great concern among analysts and policy makers. The study attempts to investigate the nature and direction of causality between inflation and budget deficits in Tanzania for the period between 1975 and 2010. The analysis was based on secondary annual time series data. Stationarity test using Augmented Dickey-Fuller (ADF) was carried out to examine the stationarity of the variables used in the study. It is proved that the variables were stationary, though not in levels but in first differences.

The study employs a cointegration and error correction model (ECM) technique in examining the existence of long-run relationship among the variables. All variables involved are integrated of order one while the error correction model estimates indicate the existence of a long-run relationship between inflation and budget deficits. Granger causality pair-wise test was conducted in determining the causal relationship among the variables. The results showed that there was no causal relationship running from inflation to budget deficit, while the causal relationship from budget deficit to inflation was significant. This implies that a uni-directional causality from budget deficit to inflation existed in Tanzania, during the period under study.

On the policy area, the government has to take purposeful measures to alleviate the problem through pursuing consistent monetary and fiscal policies.

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**LIST OF ABBREVIATIONS AND ACCRONYMS**

ADF	Augmented Dickey Fuller
BEDF	Budget Deficit
BOT	Bank of Tanzania
CPI	Consumer Price Index
ECM	Error Correction Model
GDP	Gross Domestic Product
IMF	International Monetary Fun
NBS	National Bureau of Statistics
NESP	National Economic Survival Program
IMF	International Monetary Fund
URT	United Republic of Tanzania
VAR	Vector Autoregressive
VECM	Vector Error Correction Model

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background of the Study

Persistent government budget deficit and computing government debt have become major concerns in both developed and developing countries. The theoretical and empirical literatures have been developed to examine the relationship between budget deficits and macroeconomic variables. The monetarists share the view that fiscal deficit are harmful to an economy.(Cagan1956and Bailey 1956) While some of the increases in the deficits have been associated with deflating tax revenue resulting from the recession, other relate to the increase in debt service payments on public debt (Downbust and Reynosa1993)

The development of a budget deficit is often traced to the Keynesian inspired expenditure led growth theory of the 1970s. Most countries of the world adopted this theory that government has to motivate the aggregate demand side of the economy in order to stimulate economic growth. Therefore its consequence on macroeconomic variable cannot be underestimated in most countries of the world Tanzania inclusive.

The budget deficit is found to be significantly inflationary due to the structure of the Tanzania economy (Solomon and de wet, 2004). The reason of budget deficit in developing countries including Tanzania can be stated as unstable public revenue,

low degree of economic development, low acceleration of public revenue, deficient government auditing and regulatory role of government in the economy.

Government deficit is of much concern in Tanzania's current economic problems. Particularly government spending is considered to have contributed significantly to the country's inflation and external imbalance.

The trend of inflation in Tanzania shows inflation is fluctuating between 10 per cent and 20 per cent. At the beginning of 1980, a radical increase was recorded and inflation rose to 30 per cent. At the end of 1980s it stabilized and dropped to 20 per cent (Laryea and Sumaila).

However weak fiscal structure, high level of foreign indebtedness which increases the burden on the budget, more imports than exports leading to trade deficit and high public expenses and high current account deficit have been among reasons.

During the 1980s, most developing countries especially those of Africa started with large fiscal imbalances from fluctuations in GDP, high government spending with declining trade tax revenue because of the collapse of commodity prices during the period. These economic problems lead to increased budget deficit and public debt levels. Moreover, the two oil price shocks in the mid-1970s and 1980s made the economies of the non-oil exporting countries suffer much with the rise in oil prices.

The overall fiscal deficits indicate how much the government would have to borrow to achieve fiscal balance. Since most countries especially in Sub-Saharan Africa

countries have limited access to domestic and foreign financing, the overall deficits has now been a measure of the potential risks off resorting to inflationary financing or financing deficits domestically in other distortionary ways (i.e. incurring arrears with government supplies or taxing the financial sector). This has made high budget deficits to usually mean rapid money growth, high inflation, capital flight, large current account deficits and macroeconomic instability. All these have however been considered as the major driving forces behind a country's pursuit of "prudent fiscal policies" aimed at reducing the deficits from excessive levels and attaining surpluses for a sound macroeconomic climate. (Sandy, 2003)

These economic crises affected different countries differently although they had the same/common roots in sub-Saharan Africa. Due to the effects experienced there has been diverse response on the economic problems. The Tanzanian economy has remained one of the few cases that have experienced a relatively high inflation rate, accompanied by high fiscal deficits (for a prolonged period) in the absence of any hyperinflation.

Moreover, the ratio of budget deficit to gross domestic product (GDP) has been declining over years, since 1983 the economy has experienced a single digit ratio (BOT report, 2011). The ratio of budget deficit to gross domestic product (GDP) in the years before 1983 was around 10 percent.

The causes of budget deficit in developing countries including Tanzania can be stated as unstable public revenue, low degree of economic development, deficient



government auditing and the regulatory role of government in the economy. Other reasons include weak fiscal structure, high level of foreign indebtedment which increases the burden on the budget, more imports than exports leading to trade deficit and high public expenditure.

With the increase in inflation rate leads to the rise of cost of living thus worsening the welfare of the people. The increase in inflation leads to government budget deficit hence less provision of goods and services by the government due to revenue collection lags. Developing countries usually resort to the four alternatives in financing their high budget deficit which are printing money, running down foreign exchange reserves, borrowing from abroad and domestic markets.

## **1.2 Research Problem Statement**

The relationship between public sector deficit and inflation is one of the important and controversial issues in the academic literature as well as in economic policy field. Monetary and fiscal policy has been much concerned on control of inflation in the recent time as demonstrated in the various budgets and policy statements.

There have been increasing budget deficits in Tanzania economy which reflects high inflation among others. The influence of budget deficit on inflation is positive. According to Friedman's theory of money inflation is monetary phenomenon thus budget deficit when monetized it increases the money supply thereby increasing the price level (inflation).

The relationship between budget deficit and inflation originated from empirical studies, according to Keynes, the classical economists gave importance to a balanced budget, yet they didn't analyze its impact on price levels. Apart from classical economics, Keynes saw the fiscal imbalances and budget deficits as internal components of aggregate national demand (Corsetti and Roubini, 1997).

High foreign borrowing lead to debt s crisis, and too much domestic borrowing lead to high real interest rates and crowding out of private investment (Bradley, 1986; Fischerand easterly1990).

When inflation get too high people try to find other means of conducting transaction which are less efficient and market transaction become more difficult to conduct. For the country to realize her goals of achieving rapid economic growth there is a need to attain macroeconomic stability, a feature that can be attained if restricting money supply growth, control inflation and government that generate deficits

From the consequences mention above and the fact that inflation has been rising to two digit, a study of how to restrict government deficits and inflation in Tanzania and still achieve growth is necessary. This warrant the need for the study.

In most studies being made uses a single equation model for money growth or inflation in which budget deficit is treated as exogenous variable among others example ; Chimobiand Igwe (2010) and Cheah eral (2011).These studies concluded positive and statistically significant coefficient on the deficit variable which has been taken as evidence to support the hypothesis that budget deficit cause money growth

(inflation) the same investigation was done in Tanzania by Solomon and de wet (2004) ended with the same result.

### **1.3 Objective of the Study**

The purpose of the study is to examine the causal relationship between budget deficit and inflation in Tanzanian economy

### **1.4 Specific Objectives of the Study**

- a) Examining the influence of money supply on the rate of inflation in an economy.
- b) Testing how money supply is positively related to budget deficit.
- c) Examining the relationship between budget deficit and money supply.
- d) To assess the factor determining budget deficit also factor determining inflation Tanzania economy.

### **1.5 Significance of the Study**

The study will be useful as reference for further studies or researches. The control of inflation has been central focus to both monetary and fiscal policy in recent years as demonstrated in the various budgets and policy statements. By the end of the study I expect the results to be useful in justifying the application of different monetary and fiscal policies. Maintaining inflation rate within reasonable target continues to be one of the principal goals of the on going economic reforms.

## **CHAPTER TWO**

### **2.0 AN OVERVIEW OF THE TANZANIA ECONOMY**

#### **2.1 Introduction**

This chapter reviews the background of the Tanzania economy for the 1975-2010 periods. It comprises three main sections, namely; section one (2.1) that deals with The budget deficit and financing for period 1975-2010, section two (2.2) describes the trends of various macroeconomic variables of the economy, and section three (2.3) presents the causes and consequences of budget deficits and inflation in the country.

#### **2.2 The Budget Deficit and Financing**

Government spending is considered to have contribute significantly to the country's inflation and external imbalance .These phenomena has been seen as being very much dependent on securing closer at the dynamics of the components of the budget balance Budget deficit is the amount by which government spending exceeds its income over a particular time.

Usually government finance its deficit through domestic borrowing where government sell treasury bonds through a tender system and borrowing from central bank which is basically printing of money to finance deficit .Also government borrows from abroad country or monetary institution to finance deficit.

According to the central bank (Bank of Tanzania) the government has been continuously pursuing an expansionary fiscal policy. The main culprit for the expansionary fiscal stance was increasing pressure from the public seeking to achieve faster economic growth. Government responded by expanding its expenditure on development projects and infrastructure improvement. However, when the impact of increasing fiscal deficit was felt at the end of 1996, an immediate policy shift was observed. The ensuing macroeconomic instability (high inflation rate and high interest rates) was combated using tight fiscal discipline. The low inflation rates achieved at the end of the 1990s and early twenty-first century is explained by the introduction of improved fiscal discipline.

With the assistance of donor community, government embarked in 1985 on an ambitious stabilization agenda. In fiscal area, efforts were focused on strengthening fiscal management via broad-based policy and administration reforms. At the same time, increasing transparency and coordination with donors on macroeconomic policies and structural reforms helped to mobilize financial support and kept the share of budget deficit to GDP below 5 percent.

On the side of how the budget deficit is financed in Tanzania gives a realistic picture of the inflationary effect of the fiscal deficit. In Tanzania, budget deficits have been financed from domestic and foreign sources. The source of finance implies a different effect of a budget deficit on inflation. Domestic financing is more inflationary than foreign financing in many developing country economies because of the fact that the economies of these developing countries is characterized by inefficient capital

market and high dependence on developed countries for foreign reserves. Therefore, domestic financing is mostly done by borrowing from the banking system which is often monetized by the government.

The deficit was largely financed through borrowing from the banking system.

Government borrowing from the banking system as percentage of GDP was as high as 86.3 per cent in 1994 and 90.6 per cent in 1998. In 1990, as stabilization and liberalization policies and the related reform agenda began to be implemented, the availability of foreign financing increased. As the result the share of foreign financing has increased. This has helped to support the government in resolve not to make use of relatively expensive or inflationary domestic financing, while sufficient credit resources for the private sector and a necessary build up of foreign reserves. The rationalization of expenditure programs and progressive shift from domestic to foreign financing were at the core of Tanzania macroeconomic stabilization in the middle of 1990s, contributing to a sharp reduction in inflation.

**Table 2.0 Performance of Selected Macroeconomic Indicators (1975-2010)**

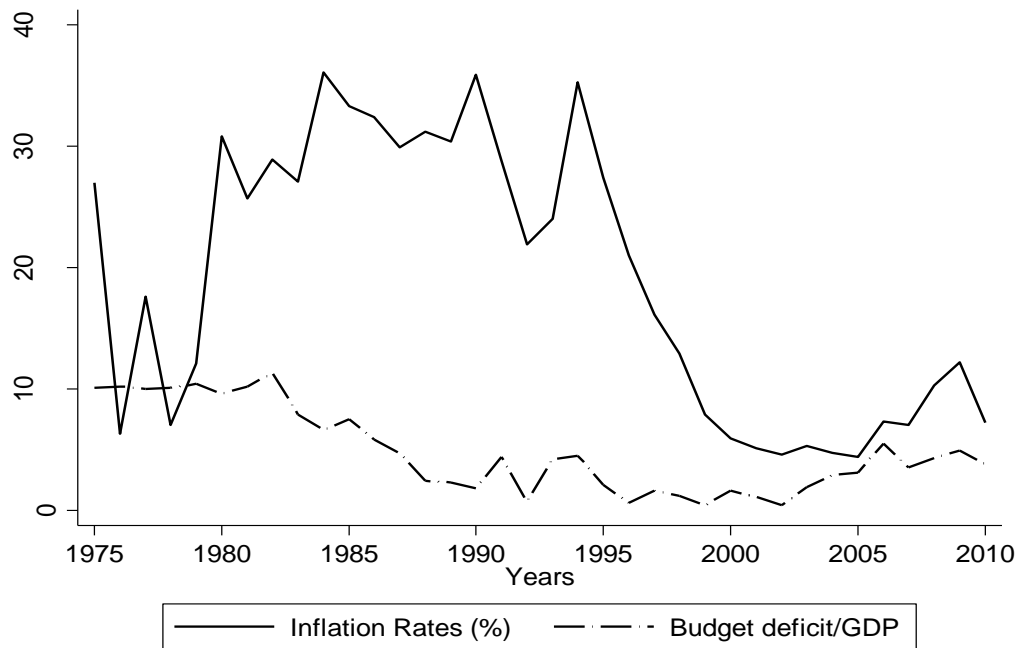
Years	Inflation Rates (%)	Exchange Rates	GDP growth (%)	Budget deficit/GDP
1975	27	8.26	5.9	10.1
1976	6.3	8.32	6.4	10.2
1977	17.6	7.96	0.4	10
1978	7	7.41	2.1	10.1
1979	12.1	8.22	2.4	10.4
1980	30.8	8.33	3	9.6
1981	25.7	9.52	-0.5	10.2
1982	28.9	12.46	0.6	11.3
1983	27.1	9.52	-2.4	7.9
1984	36.1	12.46	3.4	6.6
1985	33.3	18.11	4.6	7.5
1986	32.4	16.5	1.9	5.8
1987	29.9	51.72	4.9	4.7
1988	31.2	125	4.4	2.4
1989	30.4	192.3	2.6	2.3
1990	35.9	196.6	6.2	1.8
1991	28.8	233.9	2.8	4.4
1992	21.9	335	1.8	0.7
1993	24	479.87	0.4	4.2
1994	35.3	523.45	1.4	4.5
1995	27.4	550.36	3.7	2.1
1996	21	595.64	4.2	0.6
1997	16.1	624.6	3.3	1.6
1998	12.9	681	4	1.2
1999	7.9	797.3	4.8	0.4
2000	5.9	803.3	4.9	1.6
2001	5.1	916.3	6	1.1
2002	4.6	976.3	7.2	0.4
2003	5.3	1063.62	6.9	1.9
2004	4.7	1042.96	7.8	2.9
2005	4.4	1165.51	7.4	3.1
2006	7.3	1261.64	6.7	5.5
2007	7	1132.09	7.1	3.5
2008	10.3	1280.3	7.4	4.3
2009	12.2	1313.29	6	4.9
2010	7.2	1453.54	7	3.8

### **2.3 The Trend to Budget Deficit to GDP Ratio and Inflation Rates**

The average growth rate for inflation during the last quarter of the 1970s was 20.2 percent while for the budget deficit was 10.1 percent. The trend at that period was highly influenced by existed economic policies. During 1980s the economy was characterized by poor performance in major economic sectors such as agriculture, mining and industries compatible with poor government fiscal and monetary policies. In the 1970s the rate of inflation and budget deficit did not show up the direct relationship between them, inflation rate had higher fluctuations while the rate of budget deficit had less fluctuation.

With the adoption of economic reform programs from 1986 there were significant decline in budget deficits and inflation rate in the subsequent years. However, figure 2.1 show that there is a link between budget deficits and inflation when the means of financing budget deficits increases money supply in the economy, hence leading to inflation. In the 1980s up to the current period inflation rate and budget deficit have shown some corresponding movements although inflation rate has been much higher fluctuating than the budget deficit (Figure 2.1). With the adoption of economic reform programs from 1986 there were significant decline in budget deficits and inflation rate in the subsequent years. However, figure 2.1 show that there is a link between budget deficits and inflation when the means of financing budget deficits increases money supply in the economy, hence leading to inflation.





**Figure 2.1 Trend in budget deficit to GDP ratio and inflation rate: 1975-2010**

Source: BOT economic reports (50 years of independence) and economic bulletins.

#### **2.4 The Trend in Inflation Rate and GDP Growth Rate**

Over years the level of inflation rate and gross domestic product have a negative relationship, when the level of inflation increases the level of gross domestic product declines for instance in the year 1975 inflation rate was 27 percent while gross domestic product was 8.26 percent. Their relationship has been much observed during 1980s when the inflation rate was much higher compared to gross domestic product in which in the year 1981 and 1983 declined to -0.5 percent and -2.4 percent respectively as shown in the table 2.0.

Figure 2.2 illustrates the negative relationship that exists between gross domestic product and the level of inflation rate. Tanzania has continued to maintain prudential

monetary and fiscal policies that have to a sustainable low level of inflation. The government has enabled to reduce inflation from 21 percent in 1996 to 4.4 percent in 2005 in the meanwhile gross domestic product grew from 4.2 percent to 7.4 percent. The level of inflation rate has been increasing since 2006 from 7.3 percent to 12.2 percent in 2009 with slight decline in the year 2010.



**Figure 2.2 Trend in inflation rates and GDP growth rates: 1975-2010**

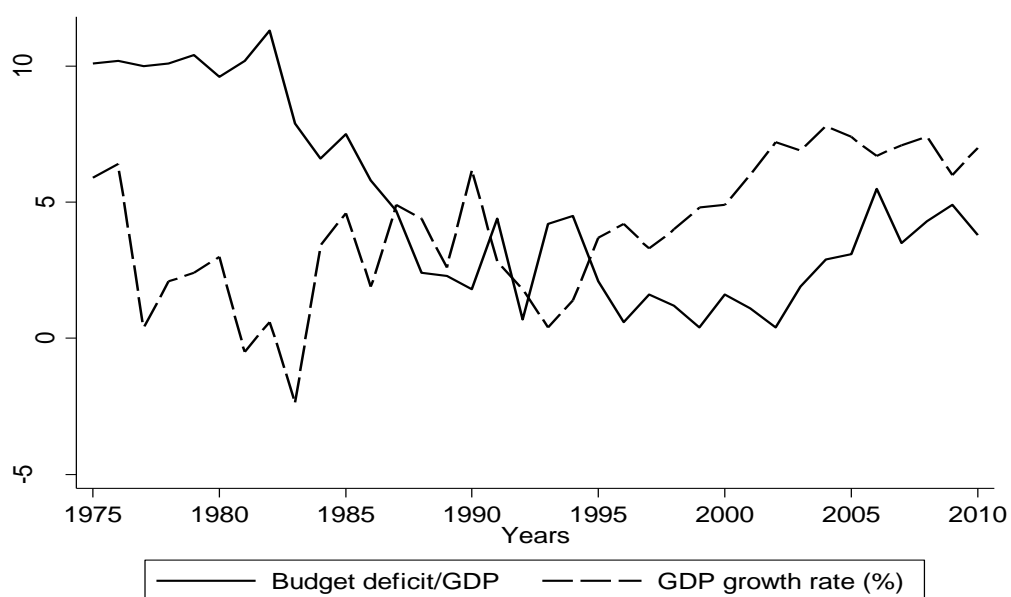
Source: BOT economic reports (50 years of independence) and economic bulletins

### **2.5 The Trend in Budget Deficit Ratio to GDP and GDP Growth Rates**

Budget deficits have adverse effects on economic growth, with the given data from table 2.1 proves the negative relationship that exists between them. The neoclassical economists who argue that budget deficits have detrimental effect on economic growth support the argument.

A high budget deficit has a potential effect of crowding out private investment through its impact on the long-term interest rate.

For instance in the years between 1977 and 1983 the level of GDP growth rate grew at an average of 1.3 percent which was relative low to the level of budget deficits ratio to gross domestic product which was high at an average rate of 8.4 percent. Since 1984 the level of GDP growth rate has been increasing relative to the level of budget deficits ratio to gross domestic product.



**Figure 2.3 Trends in budget deficit to GDP ratio and GDP growth rate: 1975-2010**

Source: BOT economic reports (50 years of independence) and economic bulletins.

## 2.6 Summary

The chapter has also explained various causes of inflation other than budget deficits; it has explored the link between budget deficits and inflation over the entire study period.

The adoptions of various stabilization programs and economic reforms have fueled better performance of our economy. The combined effects of these reforms have generally had a positive impact on the economy's growth. For example, economic growth averaged 3 to 4 percent on average during the period 1985 to 1991, and the level of international reserves improved to about 3 months of imports by the end of 1992/1993. The chapter indicates the attainable success in economic performance since independence despite the economic crisis that the country has gone through. However, inflation remained above 30 percent and fiscal discipline declined toward the middle of the 1990s with both budget and external current account deficits increasing sharply.

The government has enabled to reduce inflation from 21 percent in 1996 to 4.4 in 2005; during the same period gross domestic grew from 4.2 percent to 7.4 percent. However, the level of inflation has been increasing since 2006 from 7.3 percent to 12.2 in 2009 with slight decline in the year 2010. In the same period the level of gross domestic product have remained relatively the same despite the slight decline in 2009 from 7 percent to 6 percent.

Tanzania has continued to maintain prudential monetary and fiscal policies that have lead to a sustainable low level of inflation.

## **CHAPTER THREE**

### **3.0 LITERATURE REVIEW**

#### **3.1 Introduction**

This chapter covers theories and studies done by other economists on the same study or related studies.

It involves consideration of findings being done by other economists; some of the theories that are meaningful in modeling the model of the study. This part is categorized into three sections; reviews on core theoretical literature, reviews core empirical literature and emerging research gap.

#### **3.2. Theoretical Literature**

There exists two antagonistic theoretical links in explaining the relationship between budget deficit and inflation, there is monetarist views and non-monetarist views (structuralism view);

According to the monetarists, inflation is a domestic monetary phenomenon which comes about when the central bank increases the money supply in excess of the demand for money. Such increases in money supply can be caused by the monetary financing of fiscal deficits or by extending too much credit to the private sector. Monetarists see the short term solution to inflation as the implementation of restrictive monetary policy. The modern literature on inflationary financing of budget deficits builds on the work of Cagan (1956) and Bailey (1956).

Recent contributions include the model by Downburst and Reynosa (1993) and a review of the literature by Dornbush and Fischer (1993).

Structuralist economists distinguish between basic (or structural) inflationary pressures and mechanisms that propagate such pressures (Kirkpatrick and Nixon, 1987). Key structural bottlenecks identified include distorting government policies, the conflicts between capitalists and workers over the distribution of income between profits and real wages (Agenor and Montiel, 1996), the inelastic supply of foodstuffs, the foreign exchange constraint and the government budget constraint. The mechanism that propagates inflation is therefore the efforts by social classes and /or sectors to maintain their relative positions in the face of price increases (Kirkpatrick and Nixon, 1987).

In recent years, several authors have developed models with both monetarist and structuralist features by directly augmenting the monetarist approach with cost push factors. One approach has been to model the fiscal deficit as the original forces and the propagating mechanism in the inflationary process (Aghvli and Khan, 1978). Others introduce naturally structuralist features into monetarist models Sowa and Kwaye, 1993; Adam, 1995; Ross 1998; Durevall and Ndung'u, 1999.

The monetarist view which holds the money supply is responsible for inflation further emphasizes that for stable prices to prevail money supply should grow at the same pace as real income. An increase in money supply raises effective

demand if goods are not increased the money that was enough for the previous level of production now chases fewer goods, hence causing inflation.

The study conducted by Rwegasira and Kanneworff (1980) identified causes of inflation in Tanzania, which include; structural dependence of the Tanzanian economy on foreign economic systems, rising costs of imported inputs and finished goods especially fuel prices, poor performance of foreign trade leading to balance of payment problems and inability to import for domestic production and supplement consumption, declining productivity and efficiency in the economy leading to rising costs with effects transmitted through cost accommodating pricing methods, poor performance of agriculture leading to demand pressure on available agricultural products and foreign exchange problems, population growth and consequent pressure on available resources, and excessive money supply in the economy.

Many studies on inflation have relied on one or more of the above mentioned causes on inflationary pressure in Tanzania. Also, several studies that are summarized in this indicate that both structuralist and monetarist explanations are relevant in Tanzania. A chain of events are responsible for the inflationary pressure.

The term budget deficit can be defined as the difference between budget revenue and budget expenditure. Budget revenue includes three important components which are tax revenue; tax exempt revenues and private include revenues. Inflation is a rise in the general level of prices of goods and service in an economy over a period of time.

When the general price level rises, each unit of currency buys fewer goods and services. Consequently, inflation also reflects erosion in the purchasing power of money, a loss of real value in the internal medium of exchange and unit of account in the economy.

The major determinants of inflation (factors influencing inflation) includes the following; budget deficit, exchange rate depreciation, real GDP growth and broad money growth . Broad money growth has positive relationship with inflation while real GDP growth has negative relationship with inflation rate. Others, exchange rate depreciation and budget deficit both have positive relationship with inflation.

The link between Inflation and budget deficit is when the government desires to maintain certain level of expenditure, and when its normal sources of income are inadequate a deficit is created. The deficit is financed by borrowing from the banking system. This increases money supply and further inflation is propagated. Financing of the fiscal deficits play an important role in the inflationary process and the increase in this deficit is largely owing to the differences in the lags of government expenditures and revenue.

An increase in inflation leads to increase in the amount of fiscal deficits owing to the fact that while money expenditure keep pace with inflation, nominal revenue tend to lag behind. The financing of this deficit, usually through government borrowing from the central bank increases money supply thus creating further inflation. Therefore, increase in the supply money both causes inflation and positively affected by it.



### 3.3 Empirical Literature

There are numerous studies being on the same or related topic, the studies had focused on the two perspectives; structuralist (non- monetarist) approach. The studies made are summarized as follows;

Kilindo (1982) uses a simultaneous econometric model developed by Agheli and Khan (1978) to examine the relationship between increase in supply of money and inflation in Tanzania for the 1970 – 1979 periods. The basic hypothesis was that an increase in the rate of inflation, whatever its cause, increase in real value of the fiscal deficit, owing to the fact that money expenditure keep pace with inflation while nominal revenue tend to lag behind. Kilindo shows that the growth money supply and inflation are linked in a two – way relationship for the case of Tanzania. This link was introduced in the form of reactions of government fiscal deficit financing through money creation increases money supply and consequently generating further inflation. The limitation of the study however was the use of an inadequate data of 10 observation and this cannot yield a meaningful econometric interpretation.

Darrat (1985) investigates the direct link between inflation and other important macro variables in the case of the UK and the US using quarterly time series data from 1960 to 1982. The study employed the Granger Causality technique to analyze the relationship among the variables. The empirical results for the case of UK, among the potential determinants of inflation wage growth and budget deficit appear to be significant sources of British inflation; also the results show that money in the

UK plays no significant role in the inflationary process. For the case of US the results suggest that budget deficit is not a significant variable for the US inflation. Rather inflation in the US seems to be significantly linked to wage growth and money growth.

Mwiranga (1997) carries findings on fiscal deficit and inflation in Kenya using time series data for 1974-1997 periods. Using simultaneous equations, there hypothesis confirms that money supply is positively related to the price level. However, the data size of twenty –two observations is not sufficient for the modern econometric analysis. Moreover, the interpretations of deficits were explained by other equations and the essence of the import equation was not fully discussed.

Akinboade et al (2001) examined the determinants of inflation South Africa. The study was conducted to investigate the ways in which inflation can be combated. The study employed the use of a structural vector auto regression (VAR) model and cointegration tests to examine the existence of possible long run relationships among the variables included in our model. The results have shown that inflation in South Africa is largely structural in nature and that monetary authorities have limited control over the main determinants thereof.

Sandy (2003) analyzed the budget deficit and inflation in the economy of Sierra Leone from 1971 to 2000. the study employed the two stage least squares (2SLS) and the pair wise Granger non causality test to confirm the direction of causality for the period. The results did show an evidence of cointegration and the causality test

indicated the existence of a feedback mechanism between budget deficit and inflation.

Solomon and de Wet (2004) study the effects of a Budget Deficit in Tanzania. Examined the deficit –inflation relationship in the Tanzania economy and established the causal link that runs from the budget deficit to the inflation rate using cointegration analysis over the period 1967-2001. Using the cointegrating vector found in the study, a significant impact of the budget deficit on inflation in Tanzania cannot be refuted under the assumption of long run monetary neutrality. Using annual data of Tanzania, from 1967-2001, the existence of a stable long run relationship between the budget deficit, exchange rate, GDP and inflation is tested in this study and the result has been affirmative.

Alavirad and Athawale (2005) investigated the impact of budget deficit on inflation in the Islamic Republic of Iran. To achieve the objective, the research employed univariate cointegration test; the autoregressive distributed lag model (ARDL) and Phillips- Hansen methods, to study the relationship between the two in the long term. Based on time series annual data from 1963 to 1999, the results show that budget deficits, as well as liquidity, do have major impacts on inflation rates in the Islamic Republic of Iran.

Arize and Malindretos (2008) provided new evidence on the long run relationship between trade and budget deficit in ten African countries over the quarterly period 1973:2 -2005:4. Cointegration is used to analyze the data; the analysis reveals that

there is a positive long run relationship between the trade deficit and the budget deficit. However, in the short run the results found weak evidence that these deficits are closely linked and that the budget deficit causes the trade deficit. The analysis found the bidirectional long run causality between receives strong empirical support.

Ignacio Lozano (2008) examines the causal long term relationship between budget deficit money growth and inflation in Colombia. Using a vector error correction (VEV) model with quarterly data over the last 25 years, the study found a close relationship between inflation and money growth on the one hand, and between growth and fiscal deficit, on the other. The Johansen cointegration test suggests there is at least one cointegration vector among these variables. Under such circumstances, we employed a vector error correction (VEC) model, since it offers more and better information compared to other data generation processes.

Makochekanwa (2010) examines the deficit- inflation nexus in the Zimbabwean economy and establishes the causal link that runs from the budget deficit to the inflation rate using Johansen (1991-,1995) cointegration technique over the period 1980-2005. Due to massive monetization of the budget deficit, significant inflationary effects are found for increases in the budget deficit. Using annual data for the Zimbabwean economy for the period 1980 to 2005, the existence of a stable long run relationship between the budget deficit, exchange rate, GDP and inflation is tested in this study and the result has been confirmatory. Using the cointegrating vector found in the research, the study concludes that; a significant positive impact of the budget deficit on inflation in Zimbabwe cannot be refuted.

Sahan and Betasoglu (2010) analyzed the empirical relationship among budget deficit and inflation for Turkey and European countries. Budget deficits and inflation relationships are studied by utilizing the Larsson et al test approach for Turkey and other sixteen European countries, including Czech Republic, Hungary, Poland, Austria, Belgium, Greece, Denmark, France, Germany, Italy, Holland, Norway, Slovakia, Spain, Sweden and England over the period 1990- 2008, annually.

Apart from the traditional studies, the study also investigated the relationship by using panel data cointegration analysis. Turkey has a long term relationship among inflation and budget deficit between 1990 and 2008.

Chimobi and Igwe (2010) examined causal long term relationship between budget deficit, money growth and inflation in Nigeria. The causal long term relationship between budget deficit, money growth and inflation was tested using Pair wise Granger causality test. The result from the test indicated that money supply causes Budget deficit which means that the level of money supply in the Nigeria economy will determine whether there has been or there will be budget deficit.

Inflation and budget deficit revealed a bilateral/feedback causality proving that the changes that occurs in inflation could be explained by its on lag and also the lag values of budget deficit and in the same vein changes that occur in budget deficit is explained by its lagged values and the lagged values of inflation. Money supply on its relation to inflation solely indicated a unit- directional causality running from it to inflation.

Samimi and Jamshidbaygi (2011) examined the relationship between budget deficit and inflation which is generally ambiguous from the theoretical perspective. The study examined relationship between budget deficit and inflation in Iran using the quarterly data covering the period 1990-2008.

The study used simultaneous equation model, including four structural equations for budget deficit, monetary base, money supply and inflation. Their findings indicated a positive and significant impact of the budget deficit on monetary variables and as result of inflation. They also found a positive and significant impact of price index on budget deficit.

Oladipo and Akinbobola (2011) investigated the nature and direction of causality among the two variables. Using Granger Causality pair wise test was conducted in determining the causal relationship among the variables. The result showed that there was no causal relationship from inflation to budget deficit ( $F= 0.9, P>0.005$ ). This implies that a unit-directional causality from budget to inflation exist in Nigeria. The result showed that budget deficit affects inflation directly and indirectly through fluctuations in exchange rate in the Nigerian economy.

Cheah and eral (2011) determined the long-run relationship between budget deficit and inflation in thirteen Asia developing countries, namely; Indonesia, Malaysia, the Philippines , Myanmar, Singapore, Thailand, India, South Korea, Pakistan, Sir Lanka, Taiwan, Nepal and Bangladesh. Using annual data for the period 1950-1999

the findings from Granger causality within the error-correction model (ECM) framework suggested that all variables involved (budget deficits, money supply and inflation) are integrated of order one. Their ECM model estimates indicated the existence of a long-run relationship between inflation and budget deficits. Thus, they conclude that budget deficits are inflationary in Asia developing countries.

### **3.4 Conclusion**

Most of the studies being conducted have shown a unidirectional relationship between budget deficit and inflation including some of the studies being conducted in Tanzania. On the other hand, among the literature few studies have shown a bi-directional relationship between budget deficits and inflation. Studies have openly introduced the idea that inflation results in a widening of budget deficits financed through the banking system (mostly by the Central Bank) leading to further increase in the money supply and further increase in the prices.

### **3.5 Research Gap**

The studies reviewed shows that there is a relationship between inflation and budget deficit. Most of the studies being conducted have shown a unidirectional relationship between budget deficit and inflation. These studies have been conducted using different approaches thus some studies have shown bidirectional relationship between inflation and budget deficit. Most studies being conducted have used a single equation which gives a unidirectional result. This study intends to investigate the bi-directional relationship between inflation and budget deficit in Tanzania.

In many studies being conducted the results on the relationship between budget deficit and inflation still controversial (contradictory). Some of these studies support the uni-directional relationship and some supports the bilateral feedback, while others mostly from developed countries do not support such relationship.

Studies which supports uni-directional relationship between the two variables includes; Solomon and de Wet (2004) their findings support that budget deficit has significant impact on inflation from the Tanzania economy; Cheah and eral (2011) examined the existence of a long run relationship between inflation and budget deficit in thirteen Asian developing countries.

The studies which support bi-directional includes the following; Chinobi and Igwe (2010) examined the relationship between the two variables in Nigeria in which their results revealed bilateral/ feedback causality; Samimi and Jamshidbaygi (2011) in their findings indicated a positive and significant impact of the budget deficit on monetary variables and as a result on inflation, their study did also find a positive an significant impact of price index on budget deficit.

Studies which did not indicate to support such relationship includes: the study conducted by Darrat (1985) in US and UK, the results form US rejected the link between budget deficit and inflation, also the study done by Sahan and Betasoglu using cointegration for the EU and Turkey, the results shown no long run relationship between two variables while for Turkey there exist a long run relationship between variables.



Most of the studies conducted in Tanzania like Solomon and de Wet (2004), have been focusing on unidirectional, thus there is a need to conduct a study particularly in Tanzania that explore the dynamic causality on the relationship between the variables. The causality results have been prove in some countries including Nigeria(Chinubi and Igwe, 2011) (Samimi and Jamshidbaygi, 2011) in Iran.

Kilindo (1982) shows that the growth money supply and inflation are linked in a two – way relationship for the case of Tanzania. This link was introduced in the form of reactions of government fiscal deficit financing through money creation increases money supply and consequently generating further inflation. The limitation of the study however was the use of an inadequate data of 10 observation and this cannot yield a meaningful econometric interpretation. Therefore there is a need to conduct this study using enough observation in order to get meaningful econometric interpretation.

## CHAPTER FOUR

### 4.0 METHODOLOGY

#### 4.1 Introduction

This chapter analyzes the causal relationship between budget deficit and inflation in Tanzanian economy. The study used secondary data from various institutions; the data collected are inflation, budget deficit exchange rate and gross domestic product. The data collected ranges from the year 1975 to 2010. The studies will not involved sampling since it involves the use of secondary data. This chapter is divided into three section; section 4.1 Model specification section 4.2 testable hypothesis, 4.3 Estimation techniques and provision of data sources and description.

#### 4.2 Model Specification

In this study, a four variable single equation models is employed. Budget deficit, GDP and exchange rate treated as exogenous variable. From Friedman's theory of money, inflation is a monetary phenomenon. Accordingly if the budget deficit is monetized it increases the money supply thereby increasing the price level. When the budget deficit is monetized, an extremely high correlation exists between the budget deficit and money supply.

In order to estimate the effect of the budget deficit on inflation, the budget deficit is used as explanatory variable instead of the money supply. The exchange rate has a deterministic effect on the level of prices in underdeveloped economies. It's included as a control variable in this paper that can explain inflation. In countries like

Tanzania, an exchange rate depreciation (appreciation) could increase (decrease) the price of imported commodities. Tanzania's markets are heavily based on imported commodities, which imply the depreciation of the exchange rate could be immediately reflected on an increase on the price of the consumer's basket of commodities. The other explanatory variable is the level of GDP.

$$\text{Log } CPI_t = B_0 + B_1 \text{Log } bdef_{t-1} + B_2 \text{Log } exch_{t-1} + B_3 \text{Log } Gdp_{t-1} + U_{1t} \dots \dots \dots \text{ (i)}$$

Where;

Cpi=Inflation, which is measured by price index

bdef = budget deficit (before grants), measured as conventionally as the gap between total government expenditure and government total revenue'

gdp = the level of gross domestic product, is obtained by deflating nominal GDP by the GDP deflator real government expenditure and government revenue.

exch =the exchange rate of Tanzania's Shilling against U.S dollar price unit price of one U.S dollar

$U_{1t}$  = Error term which is independent and normally distributed.

Factors influencing inflation include the following; budget deficit, exchange rate depreciation, real GDP growth and broad money growth .Broad money growth has positive relationship with inflation while real GDP growth has negative relationship with inflation rate. Others, exchange rate depreciation and budget deficit both have positive relationship with inflation. (BOT report, 2005).

### **4.3 Theoretical Review**

The relationship between budget deficits and inflation originated from empirical studies. According to Keynes, the classical economists gave importance to a balanced budget, yet they didn't analyze its impact on the price levels. Apart from classical economics, Keynes saw the fiscal imbalances and budget deficits as internal components of aggregate national demand (Corsetti and Roubini, 1997). The underlying reason is that when budget expenditures increase, aggregate demand curve responds by shifting to the right, leading to an increase in both prices and production (Assuming aggregate supply is not perfectly elastic/inelastic). In the Keynesian economic thought, the budget deficits can be tolerable during crisis time. Moreover, Keynes saw the budget deficits as an indicator of the impact of fiscal policy on aggregate demand.

According to the monetarists, inflation is a domestic monetary phenomenon which comes about when the central bank increases the money supply in excess of the demand for money. Such increases in money supply can be caused by the monetary financing of fiscal deficits or by extending too much credit to the private sector.

Structuralist economists distinguish between basic (or structural) inflationary pressures and mechanisms that transmit or propagate such pressures (Kirkpatrick and Nixon, 1987). Key structural bottlenecks identified include distorting government policies, the conflicts between capitalists and workers over the distribution of income between profits and real wages (Agenor and Montiel, 1996), the inelastic supply of foodstuffs, the foreign exchange constraint and the government budget constraint.

The term budget deficit can be defined as the difference between revenue and budget expenditure. Budget revenue includes three important components which are tax revenue, tax-exempt revenues and private revenues. Inflation is a sustained rise in the general **level of prices** of goods and services in an **economy** over a period of time. When the general price level rises, each unit of currency buys fewer goods and services. Consequently, inflation reflects erosion in the **purchasing power** of money, a loss of real value in the internal medium of exchange and unit of account in the economy.

#### **4.4 Testable Hypothesis**

- (i) Budget deficit cause money growth (inflation).
- (ii) Money growth (inflation) cause budget deficit
- (iii) There is causal relationship between budget deficit and inflation

#### **4.5 Estimation Techniques**

Estimation of the model using non-stationary variables may lead to spurious regression results for which the interpretation of the results do not yield any economic meaning (confusing inferences).. According to Granger and Newbold (1974) when there is spurious regression results are characterized by a high  $R^2$  and a low Durbin-Watson (dw) statistic, t and F-test on the regression parameters may be very misleading. Therefore, because Times series data are usually non-stationary Before the model is estimated, a number of tests are carried out. These are testing for stationarity, order of integration and cointegration analysis.

#### 4.5.1 Testing for Stationarity (Unit Root Test)

A time series variable is said to be stationary if its mean, variance and autocovariance are finite (constant) and independent of time. Since, the data have shown some signs of trend and drift after plotting; there is need to formally test for stationarity.

There are various methods of testing for unit root such as Dickey-Fuller, Augmented Dickey-Fuller and the Phillip-Perron tests. In this study the Augmented Dickey-Fuller (ADF) test is used since it allows addition of more lags to achieve white noise error term, which is required for the distributional results to be valid (no autocorrelation). The null hypothesis tested under the ADF,  $H_0$  is rejected when the absolute value of the computed t-static is greater than the absolute of the critical value. The unit root results have been reported in chapter five. The Augmented Dickey Fuller (ADF) Test takes the following formulation; with a drift and trend model specification representation;

$$\Delta P_t = \alpha_0 + \gamma P_{t-1} + \alpha_2 t + \sum_{i=1}^n \beta_i \Delta P_{t-1} + \varepsilon_t \dots\dots\dots(ii)$$

Where,  $\alpha_0$  is drift component and  $\alpha_2$  is trend component.

$\beta_i$  Is a measure of lag length and  $\gamma$  is a measure of unit root

The hypothesis to be tested is;

$H_0: \gamma = 0$  Unit root

$H_1: \gamma < 0$  No unit root

Here the test is done by “augmenting” the DF equations by adding the lagged values of the dependent variable. The lag length is chosen to make sure that any

autocorrelation in  $\Delta P_t$  is taken away. The optimal lag length is identified so as to ensure that the error term is white noise. If we cannot reject the null hypothesis we conclude that the series under consideration has a unit root and is therefore non-stationary.  $\alpha_2 t$ , the trend component takes to account the possibility of autocorrelation in residuals and  $\Delta P_{t-1}$  is the lagged differences to accommodate serial correlation in the errors,  $\varepsilon$ .

#### 4.5.2 Co-integration Analysis and Error Correction Model

Cointegration has been developed as a technique for determining whether there is long run relationship among a set of non-stationary variables. The analysis of a differenced time series data yields short-run relationship among the variables with no information about the long run. Cointegration implies that in the long-run series that are non-stationary move together. When variables are cointegrated, regression is carried out in levels using non-stationary variables in which there is no problem of spurious regression and the coefficients are estimated as long-run coefficients.

Cointegration test involves estimating the following equations (1), (2) and (3) respectively;

$$\begin{aligned} \text{Log}P_t \\ = \alpha_0 + \alpha_1 \text{log}P_{t-1} + \alpha_2 \text{log}bd_t + \alpha_3 \text{log}y_t + \alpha_4 \text{log}m_t + \alpha_5 \text{log}er_t + U_{1t} \dots\dots(iii) \end{aligned}$$

Where it assumed that the disturbance term  $U_{1t}$ ,  $U_{2t}$  and  $U_{3t}$  are uncorrelated.

$$\text{Log}Bd_t = \alpha_0 + \alpha_1 \text{log}P_t + \alpha_2 \text{log}bd_{t-1} + \alpha_3 \text{log}y_t + \alpha_4 \text{log}m_t + \alpha_5 \text{log}er_t + U_{2t} \dots\dots(iv)$$

$$\text{Log}M_t = \alpha_0 + \alpha_1 \text{log}P_t + \alpha_2 \text{log}bd_t + \alpha_3 \text{log}y_t + \alpha_4 \text{log}m_{t-1} + \alpha_5 \text{log}er_t + U_{3t} \dots\dots(v)$$

There are two main methods of testing cointegration which include; Engle–Granger (*EG*) Approach for Univariate Models and Johansen Approach for the Multivariate Models.

However, for the purpose of this study the Engle-Granger approach is utilized which is simple in implementation and interpretation of the test, and also the approach is suitable for small sample size. Nevertheless, there are some problems with this Engle-Granger approach (Verbeek, 2008) among others include; the residual based test tends to lack power because it does not exploit all the available information about the dynamic interactions of the variables, the results of the tests are sensitive to the left-hand side variable of the regression, and it is only possible to test for one cointegrating vector as it does not provide a sufficient framework for more than two variables.

The Johansen’s approach overcomes the drawbacks of the Engle-Granger approach, the approach is used in testing for number of cointegrating vectors that is being able to detect multiple cointegrating vectors in avoiding the problem of having to select one variable as dependent variable in avoiding carrying errors one from step to another, and lastly the approach provides joint procedure; testing and maximum likelihood estimation of the vector error correction model and long-run equilibrium relations.

Though, the Johansen’s approach has the following shortcoming; the method cannot be accepted as an appropriate one since the point estimates obtained for cointegrating vector may not be particularly meaningful when given the small sample size. The



problem of multiple long-run relationships is presumably being seen as an identification problem (Granger, 1986). Also, its procedure is very sensitive to the misspecification of the lag length of the VAR model we start with. Engle-Granger representation theorem, explain that when the variables are cointegrated, there is a long-term, or equilibrium, relationship among the variables.

The short-run adjustments is estimated using the error correction model (ECM). The major advantage of error correction model (ECM) representation is that, it avoids problems of a spurious correlation between dependent and explanatory variables; also it makes use of any short-run and long information in the data.

The error correction terms ( $U_{it-1}$ ,  $U_{2t-1}$ ) will capture the speed of the short-run adjustment towards the long-run equilibrium.

$$\Delta C_t = \sum_{i=1}^n \alpha_i \Delta Q_{t-i} + \sum_{i=1}^n \beta_i \Delta C_{t-i} + \theta_1 \varepsilon_{t-1}^{\wedge} + U_{it-1} \dots \dots \dots \text{(vi)}$$

$$\Delta Q_t = \sum_{i=1}^n \lambda_i \Delta Q_{t-i} + \sum_{i=1}^n \delta_i \Delta C_{t-i} + \theta_2 \varepsilon_{t-1}^{\wedge} + U_{2t-1} \dots \dots \dots \text{(vii)}$$

The short –run causality is based on standard F- test statistics to test jointly the significance of the coefficient of the explanatory variables. The long-run causality will be based on standard t-test, negative and statistically significant values of the coefficients of the error correction terms indicate existence of long-run causality.

#### 4.5.1 Scope and Data Sources

The data collected ranges from the year 1975 to 2010; the study does not involve sampling since it involves the use of secondary data. .The study employs secondary data from various institutions; the data collected include: inflation, budget deficit, exchange rate, and gross domestic product. Data were obtained from Ministry of Finance and Economic Affairs of Tanzania, Economic survey of various years

published by National Bureau of Statistics (NBS), and Bank of Tanzania Economic Bulletins and operation reports for various years.

#### **4.5.2 Data Description**

##### **4.5.2.1 Inflation**

Inflation is rise in general level of price of goods and services in a economy over period of time. When general price level rise each unit of current buys fewer good and services. Inflation is measured by annual percentage change in level prices. The equation is  $\frac{\text{Price of most recent market basket}}{\text{price of a same market basket}} \times 100$  times hundred ( National Bureau of Statistics)

##### **4.6.2.2 Gross Domestic Product**

GDP is the market value of all official recognized final goods and services produced within a country in period of time . GDP is calculated in a annual basis it include all private and public consumption, government outlays investment and export less import. GDP is used to indicate economic health of a country as well as to gauge a country standard of living (Bank of Tanzania).

##### **4.5.2.3 Exchange Rate**

Exchange Rate is the value of country monetary at date or over a given period of time as expressed in unit of local currency per US Dollar( Bank of Tanzania).

#### **4.5.2.4 Budget Deficit**

Budget Deficit is the amount by which a government exceeds its income over a particular time. Is measured as conventionally as the gap between total government expenditure and government total revenue. ( National Bureau of Statistics).

However, the dummy variable are used in the model; dummy takes the value of one when there are economic crisis/events and takes the value of zero when there are no economic crisis/events.

The study has taken into account some the economic crisis such as; Oil crisis in 1973/74 affected the performance of the economy adversely, again in 1979/1980 there was oil crisis in which the economy was badly hit. Poor economic performance was also attributed by the war against Uganda in 1978/1979 (Kilindo, 1993). In early 1980s there was massive economic crisis attributed by adverse weather condition that seriously affected agricultural sector.

Generally, the period between 2006 and 2010 was characterized by high oil prices in the world market, severe drought which attributed to the poor agricultural production, poor hydroelectric production as well as low industrial production. In 2009 the worsening of the Tanzania economy was attributed to the global financial crisis.

### **4.5.3 Anticipated Results**

The expected results will either be in unidirectional or bi-directional causality between budget deficit and inflation. Bi-directional exists when inflation influences budget deficit like wise budget deficit influencing inflation. Uni-direction occurs when the causal relationship has no feedback mechanism. When the two variables are co-integrated, the Granger causality test will find at least one direction of causality

## CHAPTER FIVE

### 5.0 MODEL ESTIMATION AND INTERPRETATION OF THE RESULTS

#### 5.1 Introduction

This chapter performs the analysis and discusses the results of the empirical findings. It is divided into five sections; section (5.1) describes the behavior of the model; section (5.2) presents the cointegration test results and error correction mechanism; section (5.3) presents model tests and discussion; section (5.4) presents the interpretation of the empirical results and section (5.5) presents the comparison with previous studies.

##### 5.1.1 Descriptive Analysis

Normality test is carried out to investigate if the variables used in the study possessed normality property. Descriptive statistics (mean, median, mode, range, standard deviation, skewness, and kurtosis) are useful for exploring and examining data (such as how data are distributed or dispersed) prior to performing statistical tests and subsequently carrying out statistical analysis and data interpretation. The Kernel density estimation indicates that not all the variables behave normally in levels as shown in the appendix also the summary statistics in levels shows that the variables are not normally distributed. In eliminating non-normality of the variables, the variables were transformed by using a logarithmic operator. The logarithm operator eliminates the non-stationarity of the variables hence interpretation of the estimated coefficients becomes easier because they are expressed in form of elasticity.

**Table 5.1 Summary Result for the Descriptive Statistics**

	LCPI	LEXCH	LGDP	LBDEF
Mean	2.808541	5.008533	15.78584	10.19504
Median	3.310239	5.993823	15.70537	9.691172
Maximum	5.221976	7.281757	16.63859	14.47800
Minimum	-0.616186	2.002830	15.26644	6.794587
Std. Dev.	2.005770	2.059155	0.400791	2.211929
Skewness	-0.458865	-0.439985	0.651412	0.379703
Kurtosis	1.702871	1.449690	2.268405	1.943711
Jarque-Bera	3.787105	4.766672	3.349331	2.539069
Probability	0.150536	0.092242	0.187371	0.280962
Sum	101.1071	180.3068	568.2831	367.0211
Sum Sq. Dev.	140.8090	148.4042	5.622160	171.2420
Observations	36	36	36	36

LCPI=logarithm of inflation, LBDEF=logarithm of budget deficit,

LEXCH=logarithm of nominal exchange rate, LGDP= logarithm gross domestic product

The majority of the variables after transforming them into logarithm were normally distributed as shown in table 5.1; with skewness most variables were close to zero hence the distribution is asymmetrical around the mean. For the case of peakedness, most of the variables were compliment than a normal distribution (platykurtic).

Moreover, the standard deviations results are nonzero indicating variability of observations over instance.

## 5.2 Unit Root Tests

The Augmented Dickey Fuller (ADF) ensures that the problem of serial correlation is reduced (Dickey and Fuller, 1981), and it takes into account higher-order autoregressive lags. The Augmented Dickey Fuller (ADF) unit root tests were carried out on the economic variables required in the equations to determine whether the variables are stationary or not. The results reported in Table 5.2 suggest that none of the variables were stationary in their log levels, implying that the variables are integrated of higher order other than  $I(0)$ . The ADF test statistics for each of the variables are greater than the critical values at the conventional levels (1%, 5%, and 10%) which imply that the data have unit root.

**Table 5.2 ADF Unit Root Tests Results**

Variable	At Levels		At First Difference	
	t-Statistic	Order of Integration	t-Statistic	Order of Integration
LCPI	-0.0967(0.9929)	(1)	-5.5129***(0.0001)	I(0)
LEXCH	-0.6921(96590)	(1)	-4.0924***(0.0031)	I(0)
LGDP	-0.9478(0.9998)	(1)	-2.6197*(0.0989)	I(0)
LBDEF	-4.0137(0.0174)	(1)	-6.9969***(0.0000)	I(0)

The null hypothesis is that the series are non-stationary and the critical values at 1%, 5% and 10% are -3.6394, -2.9511 and -2.6143 respectively. The asterisks (\*\*\*), (\*\*) and (\*) indicate rejection of the null hypothesis of non-stationary at 1%, 5% and 10%

levels of significance at all levels of significance, respectively. The numbers in brackets are the probability values.

The critical value for each of the variables turned out to be less than the computed t-value thus concluding the time series data be stationary after differencing once. The presence of unit root requires the variables to be differenced, after differencing once all variables became stationary, implying that the variables were integrated of order one  $I(1)$ .

### 5.2.1 Tests for Cointegration

The first step in Engle-Granger approach involved estimating a regression of the following equations to obtain the residuals, and involved testing the stationarity of residuals using Augmented Dickey-Fuller test. According to Engle-Granger (1987) two step procedure, two or more series are cointegrated if they have the same order of integration. Since the variables are integrated of the same order as shown in Table 5.3 thus allows the test for cointegration. Cointegration has highlighted the existence of a long run equilibrium to which the system converges overtime. The results for cointegration tests are presents in table 5.3.

**Table 5.3 Engle- Granger Cointegration Test Results**

Regression	Test- Statistic	Order of Cointegration
Residual for equation (1)	-5.159**	I(0)
Residual for equation (2)	-6.982**	I(0)
Residual for equation (3)	-5.708**	I(0)



Test statistic is significant at 5% in which the null hypothesis suggested the existence of nonstationarity in residuals. The critical value are; -5.620, -4.827 and -4.442 for 1 %(\*\*\*), 5 %(\*\*), and 10 % (\*) respectively.

The stationarity of residuals supports the existence of long-run relationship/equilibrium among the variables used in the study although in the short-run there may be disequilibrium (Gujarati, 2009). The presence of cointegration equations enables the error correction model (ECM) to be carried out. The residuals from the cointegration test are stationary at 5% as the null hypothesis being rejected at the respective critical levels..

### **5.2.2 Error Correction Mechanism**

When a long-run relationship exists, there must be some forces that will pull the equilibrium error back towards zero; the error correction model does this exactly. The existence of a long-run relationship also has its implications for the short-run behavior of the  $I(1)$  variables, because there has to be some mechanism that drives the variables to their long-run equilibrium relationship (Verbeek, 2008), then the application of error correction mechanism which drives the short-run dynamics of the series. Following the Granger representation theorem, the following results were generated from error correction mechanism specified in equation (1), (2) and (3).

**Table 5.4 The Error Correction Mechanism results**

Included variable: Dependent variable: logcpi				
Variable	Coefficient	Standard error	t-statistic	Probability
ECT( -1)	-0.7196744	0.1908391	-3.77	0.001
$\Delta$ logexch(-1)	0.3926653	0.0921684	4.26	0.000
$\Delta$ loggdp(-1)	-1.357342	0.9579683	-1.42	0.168
$\Delta$ logbd(-1)	-0.0116583	0.0239914	-0.49	0.631
Dummy	-0.0064549	0.0528802	-0.12	0.904
Constant	0.1355353	0.0651678	2.08	0.047
$R^2 = 0.5115$ Adj.R <sup>2</sup> = 0.4069 Prob> F = 0.0016 Log likelihood -75.4128 Akaike information criterion 5.827522 Schwarz criterion 6.388001				

The significance of error correction term substantiates the presence of cointegration between dependent variable and the explanatory variables. The error correction term (ECT-1) has expected negative sign and significant at 1 percent level of significance. Its magnitude reports the speed for adjustment of around 71.9 percent, which is relatively high. This implies that, about 71.6 percent of the deviations from the long-run equilibrium are corrected in one period. The coefficient of determination (R-squared and Adjusted R-squared) suggests that the dependent variable is well explained by the explanatory variables. The probability of the F-Statistic suggests that the model has a very good vigorous. The results support the previous one that the variables are cointegrated

### 5.2.3 Granger Causality Test

The Granger causality test is used to examine the direction of the relationship that exists between the variables. Granger causality tests are conducted to determine whether the current and lagged values of one variable affect each other.

**Table 5.5 Granger Causality Pair wise Test Results**

Null Hypothesis	Observation	F-statistic	Probability
Log cpi does not Granger cause log Bdef	36	0.54915	0.760
Log bdef does not Granger cause log cpi	36	7.9307	0.019
Log cpi does not Granger cause log dp	36	2.0953	0.351
Log gnp does not Granger cause log cpi	36	21.037	0.000
Log cpi does not Granger cause log exch	36	2.3686	0.306
Log exch does not Granger cause log cpi	36	14.037	0.001
Log bdef does not Granger cause log exch	36	0.11207	0.946
Log exch does not Granger cause log bdef	36	3.3449	0.188
Log gdp does not Granger cause log exch	36	0.60514	0.739
Log exch does not Granger cause log gdp	36	2.5474	0.280
Log bdef does not Granger cause log gdp	36	3.2381	0.198
Log gdp does not Granger cause log bdef	36	5.1271	0.077

The null hypothesis is that there is no Granger Causality, rejecting  $H_0$ : if the P-value is low (less than 5 percent level of significance).

The result show that there is uni-directional Granger causality running from budget deficit to consumer price index, this is also proved in other studies; Sandy (2003), and Solomon and de Wet (2004). The test result has revealed the unidirectional Granger causality running from real gross domestic product to consumer price index (inflation). The test results do not provide evidence of Granger causality running

from the rest of the variables to exchange rate and real gross domestic product. Moreover, the result suggests the existence of unidirectional Granger causality running from real gross domestic product to broad money supply. However, the results indicated no Granger causality running from the rest of the variables towards budget deficit, despite the weak causality running from real gross domestic product. These results are similar to those of other studies, for instance; Oladipo and Akinbobola (2011).

### **5.3.0 Diagnostic Test**

The Jarque-Bera normality test for the residuals was carried out to determine whether the data were normally distributed. It yielded  $\chi^2$  statistics with their probabilities values ranging between 0 and 0.7180, and then the null hypothesis that the error term is normally distributed is not rejected hence supporting the normal distribution of residuals in the model.

The diagnostic tests suggest absence of serial correlation and the Autoregressive Conditional Heteroscedasticity (ARCH) reveals the absence of heteroscedasticity in the model. The diagnostic tests for serial correlation using the Breusch-Godfrey LM test suggest the absence of autocorrelation in these models. The tables with test results for autocorrelation are presented in Appendix D1

The White's test indicates presence of homoscedasticity, the variance of the variables do not vary over time (observations). The test results obtained do not reject the null hypothesis; results showed that the model is well specified with no omitted variables

(Ramsey RESET test) as performed in which the table in the appendix confirms the result.

The diagnostic test made in the VAR models indicates that most fundamental statistical requirement have been satisfied in which no serious weakness were identified. Moreover, results showed that the model is well specified with no omitted variables as the Ramsey RESET tests results indicate in Appendix D2. The study proceeds with interpretation as there is absence of any fundamental statistical problems.

#### **5.4 Comparison with Results of Other Studies**

The confirmation of causality between inflation and budget deficit is highly sensitive to the methodologies used, choice of the variables, the frequency of the data and also the sample period, besides other factors. Meanwhile, various studies have been done to investigate the causal relationship between inflation and budget deficit. These studies have resulted to different conclusion on the causality in which most developing countries have supported the unidirectional causality running from budget deficit towards inflation while the advanced countries have supported the bi-directional causality.

The empirical results from Kilindo (1982) concluded that the fiscal deficit plays an important role in the inflationary process through its financing. Also, Mohammad and Ahmad (1995) came out with the findings that suggest that the domestic financing of budget deficit, particularly from the banking system, is inflationary in

the long run for the case of Pakistan. The results of this study are consistent with the preceding argument as budget deficit has shown positive impact on money supply from the least square estimation.

Samimi and Jamshidbaygi (2011) in their findings indicated a positive and significant impact of the budget deficit on monetary variables and as result on inflation in Iran. They also found a positive and significant impact of price index on budget deficit. Also, this study has indicated positive relationship between budget deficit and money supply similar to the study by Sandy (2003) for the case of Sierra Leone.

The study by Solomon and de Wet (2004) their results show that money is a significant explanatory variable of the inflationary processes in Tanzania. These studies support the results of the study as shown in Granger causality pair wise test as well with least square estimation; the same relationship has been shown by Sandy (2003) for the case of Sierra Leone.

The results obtained from Solomon and de Wet (2004) show how exchange rate leads to inflation particularly to Tanzania as among the countries which depend on importation. The depreciation of the exchange rate immediately reflects on an increase on the price of the consumer's basket of commodities.

## **CHAPTER SIX**

### **6.0 SUMMARY, POLICY IMPLICATION AND RECOMMENDATIONS**

#### **6.1 Introductions**

This chapter consists of four sections. Section 6.1 presents the summary of the study; section 6.2 presents the finding of the study presents; section 6.3 policy implications and section 6.4 presents limitations of the study and areas for further research.

#### **6.2 Summary**

The purpose of this study was to investigate the causal relationship between budget deficit and inflation in the Tanzania economy for the 1975-2010 period. The controversial relationship between budget deficit and inflation has motivated the study. It has been observed that over years there is an increase in budget deficit in line with an increase in the inflation rate. In exploring their relationship the study has employed various techniques such as unit test, cointegration test, error correction mechanism, Granger causality test .

#### **6.3 Main Findings of the study**

The study attempts to offer evidence on the causal long- term relationship between budget deficit and inflation in Tanzania. The test for stationarity using Augmented Dickey-Fuller (ADF) test proved that the variables used in this study are stationary, though not in levels, but in their first differences. The Zivot-Andrews test found that the variables are not stationary in levels, but in their first differences. The next step involved test for cointegration using the Engle-Granger approach (1987) which

proved the existence of cointegration equation. Under such circumstances, we employed the error correction model (ECM), since it offers more and better information compared to other data generation processes. The results point to a close long-term relationship between inflation and budget deficit.

Inflation and budget deficit revealed a uni-directional causality running from budget deficit towards inflation, proving that the changes that occur in inflation could be explained by its own lag and also the lag values of budget deficit, hence it can be concluded that when budget deficits increase inflation is also expected to increase though not at the same rate.

The empirical results have shown no causal link running from money supply to budget deficits or from budget deficits to money supply. Furthermore, the results reveal that there is a unidirectional causal link running from nominal effective exchange rates to inflation through exchange rate depreciation, which then leads to speeding up of inflation rate (the rise in price of domestic goods) as the country depends more on imports of goods and services. The type of inflation is referred as imported inflation.

The study findings indicate that inflation depends mainly on the evolution of money supply as proven from Granger causality, thus inflation is termed as a monetary phenomenon.

The findings of the study have shown that there is a link between budget deficits and inflation with causality being a unidirectional running from budget deficit to inflation, The causal long-term relationship between budget deficit, money growth



and inflation could vary depending on the degree of independence of the central bank and the type of monetary-policy regime, as it has been explored in other studies.

#### **6.4 Policy Implications and Recommendations**

The findings of this study implies that budget deficit causes inflationary pressure through its financing in which money supply increases thus leading to inflation. Through that view control of budget deficit has to be given a considerable precedence in restriction the inflationary pressure.

Knowing the budget deficit's impacts on inflation rate, the budgetary authorities require deliberate action in eliminating or cutting down budget deficit so as to get rid of inflation rate. Among other measures, the authorities are required to tighten government expenditures, improving tax collection in line with tax reforms and avoiding unnecessary expenditures.

There is a need to reshape the revenue system. This would involve widening the tax base, simplifying the tax collection system, and giving spending units greater room for raising their own revenue. This will help to reduce budget deficit as most government departments will be able to afford.

Since the growth of money supply is greatly influenced by expansion of credit, (especially to government), there is also need to limit government bank borrowing to finance deficits. In line with this policy, it is necessary to make more efficiency on banking system to achieved competitiveness

According to the findings of the study, there is need for the adoption of restrictive monetary policy in which the supply of money must be constrained to grow steadily at the rate of growth of real output.

A finding of the study suggests that, Tanzania's economic growth seems to have a considerable effect on inflation. Increasing the level of economic growth in the country can permanently lower the level of prices. The growth in GDP, especially if it emanates from the agriculture and food processing industry, could ease the demand pressure for food related products. The consumer price index assigns a weight of 65 per cent for food products in Tanzania. Higher agricultural output will decrease the inflation rate significantly. On the whole, policies to control inflation should have in-built ability to increase the productive capacity of the economy.

Additionally, the government has to take into consideration factors like exchange rate which have shown significant impact on inflation as presented in Granger causality pair wise test. Exchange rate affects the price of imported goods and services which our country depends on. In improving the exchange rate the country has to increase its productivity to reduce the rate of importation. The depreciation of exchange rate accelerates the domestic price levels thus leading to inflation.

#### **6.4 Limitation of the Study**

Limitation of this study rests in its scope, data availability and reliability. The study covers the period from 1975 to 2010 in exploring the causal relationship between budget deficits and inflation in Tanzania. Since this study uses secondary data,

Tanzania like other developing countries has been facing data problem of data inconsistent with one source to another in which the reliability and quality is normally low. Measurement errors in variables tend to reduce the significance of the coefficient. The other limitation emanates in data compilation from the International Financial Statistics (IFS). Accurate data are difficult to collect as the common problem among the developing countries. Due the sample size the study could not utilize the Johansen Approach (1988) which requires large sample in its application; the Johansen approach is more complex and comprehensive in its procedures as it improves the drawbacks of Engle-Granger (1987) which has been applied.

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## APPENDICES

### Appendix A: Data Used in the Analysis

YEAR	CPI	EXCH	GDP	M2	BDEF
1975	0.54	8.26	4267088	5552.7	1175
1976	0.58	8.32	4540453	6946.8	1839
1977	0.64	7.96	4558697	8346.7	1972
1978	0.71	7.41	4655789	9396.3	2103
1979	0.81	8.22	4768399	13806.6	2732
1980	1.14	8.33	4910995	17519.8	4796
1981	1.491	9.52	4886251	20694.7	4346
1982	1.874	12.46	4915189	24728.6	5037
1983	1.416	9.52	4799225	29127.4	3055
1984	3.07	12.46	4960695	30218.1	6145
1985	4.179	18.11	5188430	38971	6469
1986	5.57	16.5	5286571	50353.4	7669
1987	7.375	51.72	5547229	66442.9	15568
1988	10.89	125	5793006	92987.7	2185
1989	13.14	192.3	5941728	123800.1	-6782
1990	15.6	196.6	6311832	178061.8	-8052
1991	20.2	233.9	6487302	232900.1	4499
1992	24.6	335	6605252	352272.3	-89601
1993	30.5	479.87	6631608	472017.5	72141
1994	41.2	523.45	6724455	647840.3	104515
1995	52.5	550.36	6971727	765908.4	62442
1996	63.6	595.64	7264351	684990.6	16804
1997	73.8	624.6	7504710	760353.3	86290
1998	83.3	681	7803926	844929.4	68137
1999	89.8	797.3	8181671	972088.6	24424
2000	95.1	803.3	8585338	1093610.9	113272
2001	100	916.3	9100275	1221919.8	-141820
2002	101	976.3	9752178	1516807.3	38757
2003	104.5	1063.62	10423735	1745738	163211
2004	108.9	1042.96	11239734	2125835.9	399739
2005	120.9	1165.51	12068089	2960415.6	727075
2006	129.6	1261.64	12881163	3454491	924413
2007	138.8	1132.09	13801849	4394622.7	955797
2008	153	1280.3	14828345	5468460.8	381264
2009	171.4	1313.29	15721301	6603404.4	1215042
2010	185.3	1453.54	16828563	8042113.2	1939624

Source: BOT (Annual reports and various Economic Bulletins)

**Appendix B: Data Used in the Analysis**

YEAR	CG	NFA	OA	REV
1985	26704.1	2670.1	1208.5	18638
1986	31191.8	629.8	1178.9	22032
1987	33698	1625.8	6305.2	29351
1988	33019.5	7167.7	6964.7	47479
1989	44469.6	9137.5	9261	70417
1990	39345.4	33439.9	102036.3	94655
1991	40373.8	48613.7	121661.8	133238
1992	89074.7	102522	118717.8	173566
1993	262100.6	74226.9	25206.5	164109
1994	270604.1	126639.7	22826.5	242444
1995	326370.5	138032.4	51302.8	331238
1996	299374.5	204147	66834.5	448373
1997	269693	295415.1	82756	572030
1998	234075	344080.3	86173	619083
1999	302788	319747.7	84464.5	703149
2000	296673.3	909657.8	3378.7	777645
2001	296673.3	727438.3	3064	929624
2002	201457.1	1091877	3693.3	1042955
2003	202202.4	1641486	927.5	1217517
2004	199211.2	1914045	853.3	1459303
2005	234679.1	1936642	4661.3	1773709
2006	453175.5	2621254	4297.2	2124844
2007	448004.5	3008489	9198.9	2739022
2008	650864.5	3592147	8767.6	3644302
2009	1109522	3845001	4844.1	4293074
2010	1512762	4760576	5272.6	4661540

Source: BOT report-50 Years of independence, Economic Bulletins,  
Operation Report (Various issues)

### Appendix C: Data Used in the Analysis

YEAR	EXP	Yt	CPS	P
1985	25551	5188430	17678.8	4.179
1986	27002	5286571	27735.1	5.57
1987	38474	5547229	55042.5	7.375
1988	45443	5793006	65121.2	10.89
1989	57298	5941728	60081.9	13.14
1990	98429	6311832	62601.6	15.6
1991	125933	6487302	466683.2	20.2
1992	161474	6605252	404081.6	24.6
1993	263413	6631608	528004.6	30.5
1994	374962	6724455	280158.6	41.2
1995	398024	6971727	247846	52.5
1996	420522	7264351	141341	63.6
1997	515389	7504710	182976.9	73.8
1998	730336	7803926	248276.2	83.3
1999	816707	8181671	311533	89.8
2000	1168779	8585338	340628.1	95.1
2001	1305035	9100275	340628.1	100
2002	1466137	9752178	570668.3	101
2003	1989538	10423735	817125.2	104.5
2004	2516943	11239734	1060077	108.9
2005	3164216	12068089	1425062	120.9
2006	3873255	12881163	2310136	129.6
2007	4474681	13801849	3151211	138.8
2008	5208996	14828345	4556168	153
2009	6734078	15721301	4991887	171.4
2010	8173749	16828563	5991884	185.3

Source: BOT report-50 Years of independence, Economic Bulletins, Operation  
Report (Various issues)



### Appendix D : Residual Tests

#### D1: Breusch-Godfrey Serial Correlation LM Test

F-statistic	3.848790	Probability	0.013356
Observation R <sup>2</sup>	13.07285	Probability	0.010925

ARCH Test			
F-statistic	3.849083	Probability	0.032649
Observation R <sup>2</sup>	6.735385	Probability	0.034469

#### D2: Autoregressive conditional heteroscedasticity Test

Ramsey Reset Test			
F-statistic	4.9903381	Probability	0.003832
Log likelihood ratio	19.92570	Probability	0.000517