

**EFFECT OF INFLATION ON BUDGET DEFICIT IN UGANDA (1991-2016)**

**BY**

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## **DECLARATION**

I Abdirahman Said Hassan declare to the best of my ability that this Research thesis is as a result of my own efforts and has never been submitted for any academic award to this university and any other university or institution.

Signed.....

Date.....

Abdirahman Said Hassan



## **DEDICATION**

I dedicate this work to my father Said Hassan Yusuf and my mother Isnino Osman Said who have laid for me an academic foundation that has led me to this level and lastly to all my friends for their motivation and developmental ideas.

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## **LIST OF ACRONYMS**

AFD	Augmented Dickey Fuller
CPI	Consumer Price Index
ECM	Error Correction Model
EXR	Exchange Rate
FDI	Foreign Direct Investment
GDP	Government Budget Deficit
GDP	Gross Domestic Product
IRR	Interest Rate
M2	Money Supply
NBS	National Bureau of Statistics
OECD	Organization for Economic Co-Operation and Development
PP	Phillip Perron
RGDP	Real Gross Domestic Product
WDI	World Development Indicators
WEO	World Economic Outlook

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## ABSTRACT

*The study sought to establish the effect of inflation on budget deficit in Uganda 1991-2016. The factors identified in the study are Budget Deficit Rate, Interest Rate, Inflation Rate, Foreign Exchange, Foreign Direct Investment and Gross Domestic Product. The theory that was guiding this study is the Neoclassical theory. The reason behind conducting this study was the increment of inflation at a decreasing rate. The study used quantitative data in form of secondary data from Uganda for a 25 years' period from 1991 to 2016. All the data was expressed in terms of percentages and co-integration design was considered appropriate as it enables the establishment of the long run relationship among the variables. The short run effect of inflation on budget deficit has been conducted by using ECM. Under co-integration the findings were showing a presence of a long run relationship in the variables in the study and for the short run there was negative and significant relationship between Inflation and Budget Deficit. From the findings, the researcher concluded that the effect of inflation on budget deficit depends on how the funds financing the deficit were used, if it was used for development purposes then it would have a positive one on the budget deficit but if it is for meeting the recurrent expenditures then there would be a negative relationship between the two. The study recommends that Uganda should broaden and manage efficiently the tax base in order to finance their expenditure adequately and help increase the multiplier that further generate output hence reduces budget deficit incidents. The study also recommends that Uganda should create more revenue sources to increase the income to reduce dependence on developed countries and also to create conducive environment for more opportunities. The study contributes that there is a need for Ugandan government to support the growth in the real sectors of the economy such as the agricultural sector and manufacturing sector by encouraging investors to have access to investable funds from banks; as suggested by alavirad, a and athawale, s. (2015) in their study the impact of inflation on budget deficit in the Islamic republic of Iran so that incidents of budget deficit is checked*

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.0 Introduction**

This chapter will show the background to the study and the statement of the problem. It will reveal the objectives, for which the study was be carried out, presents the research questions and highlights the scope and significance of the study.

### **1.1 Background to the study**

#### **1.1.1 Historical perspective**

For many years the relationship between budget deficit and inflation has been one of the most widely researched topics in macroeconomics across the globe (Alavirad and Athawale, 2015). For most of its history, the U.S. budget deficit remained below 3 percent of GDP. It exceeded that ratio to finance wars and during recessions. Once the wars and recessions ended, the deficit-to-GDP ratio returned to typical levels. An examination of the deficit by year reveals the deficit-to-GDP ratio tripled during the financial crisis. Part of the reason was slower economic growth. But part was increased spending to get growth back on track. Military spending also doubled to pay for the wars in Iraq and Afghanistan. Also, during the 2008 financial crisis, the dollar's value strengthened by 22 percent when compared to the euro. Investors consider the dollar to be a safe haven investment. The dollar rose again in 2010 as a result of the eurozone debt crisis. As the dollar's value rises, interest rates fall. Akcay et al., (2012) examined data for almost 100 countries for the period between 1960 and 1990, and found that the impact of inflation on growth and investment is significantly negative, given that a number of countries characteristics are constant.

Developing nations do not have the pleasant problem of rising full – employment budget surpluses and fiscal drag. Rather, the problem in the typical developing nations is the existence of budget deficits which inevitably leads to inflation, balance of payment deficits and escalating external debt (Iyoha, 1999). Since neither monetary non exchange rate targeting regimes was able to achieve their desire goals of (price stability, steady Economic growth, full employment and other macroeconomic policy objectives.) therefore, developing countries have recently shifted to inflation targeting as best option for their monetary policy regime. (Nigeria and South Africa are not in an exception).

Price stability in any economy depends slovenly on the Central Bank independence and financial market development. If the Central bank is not independent enough to block all the external forces that would compel it to create money so as to finance the deficit, then the country is likely to experience high inflation. This therefore, suggests that inflation management lies in the hands of central bank and the financial market (John, 2013). The development of a budget deficit it 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. However, its consequences on macroeconomic variables cannot be underestimated in most countries of the world. (Olomola & Olagunju 2004).

One of the major consequences is the structural inflation. Structural inflation occurs from either expansionary fiscal policy or expansionary monetary policy. Also, budget deficit occurs if the government is focused to spend beyond its tax revenue. In order to clear the deficit, the government needs to either borrow or create money, but under certain conditions. (e.g in an emerging scigniorage revenue John, (2013) and Leeper, (1991) describe a situation where fiscal deficit imply that inflation will eventually occurs as the one where there is an active fiscal policy. Such a situation is also known as fiscal dominance. With fiscal dominance, an increase in government debt will eventually requires an increase in seigniorage. A contractionary monetary policy aimed at

producing lower inflation will initially lower seigniorage, revenue and requires additional debt be issued. This ultimately leads to higher inflation. If the fiscal authority does not adjust, the monetary authority will be forced eventually into producing higher inflation.

Uganda's economic history has gone through four distinct episodes since independence. Between 1960 and 1970, Uganda had one of the most vibrant economies in sub-Saharan Africa. Real GDP grew at an average rate of 4.8% and GDP per capita grew at 3% per annum (Cagan, 2011). From 1971, the situation changed drastically. The economy experienced domestic and external shocks, which were worsened by the absence of sound macroeconomic policies to address them. Productive sectors were ignored in pursuit of informal trade, as most skilled personnel fled out of the country to escape the economic mismanagement and civil unrest, in which they were often thought as soft targets. The breakdown of the East African Community, the rising prices of petroleum products, and the "economic war of 1972", which led to the expulsion of Asians and expropriation of their assets, further worsened the situation (Catao and Terrones, 2014). For most of the 1970s and 1980s the country suffered severe macroeconomic imbalances, including high rates of inflation and balance of payments deficits, because the growth of nominal aggregate demand consistently outstripped the growth of real supply in the economy. The main reason for this was the printing of money to finance public sector deficits, leading to large increases in money supply which fueled high rates of inflation.

### **1.1.2 Theoretical perspective**

In the theoretical perspective Inflation is generally seen as a monetary phenomenon. However, the literature identifies a number of theories of inflation. These theories are: demand-pull, cost-push, structural, monetary and internationally transmitted inflation (i.e, imported inflation). However, for the purpose of this study, the relevant theory of inflation is the demand-pull theory as viewed by the Neo-classicals and monetarists. The demand-pull theory holds that inflation occurs when the aggregate demand for goods and services exceeds the aggregate supply assuming that the economy is operating at full employment level.

### **Neoclassical or Old Quantity Theory**

The origin of the quantity theory of money is traceable to Irving Fisher. Fisher (1911), explained in detail how the quantity of money influences both the level of prices (inflation or deflation) and the rate of production and employment (depression or prosperity) in the economy. He used the "equation of exchange" to illustrate this theory.  $MV = PQ$  Where M =Money Stock; V=Velocity of Circulation; P=General Price level; Q=Quantity of output of goods and services produced and sold in the economy. V and Q are assumed to be fixed given full employment level of income. Thus, any change in M leads to a proportionate change in P. that is,

$$M = P Q / V \quad \text{therefore, } M = P$$

### **Monetarist Theory**

Friedman (1968) sees inflation as a monetary phenomenon. According to Jhingan (2008). The monetarists hold that inflation arises as a result of increase in the money supply. This model is based on a stable money demand function in which money is demanded for transactions and precautionary purposes only. They assume that money supply is exogenously determined and controlled by the monetary authorities. Here, inflation occurs when money supply expands more rapidly than money demand.

The theory holds that an increase in money supply increases the nominal income of people which leads to an increase in their demand for goods and services. This leads to increase in production and hence, increase in the demand for more production inputs. If the economy is at full employment level, this leads to an increase in production costs which then reduces the profit margin and which in turn increases the prices of goods and services. Inflation occurs depending on how people react to this price increase. If it is a temporary price increase, people will increase their money demand.

### **1.1.3 Conceptual Perspective**

Inflation, according to Johansen, (2012), is an increase in the average price level, not a change in any specific prices. So, a common measure of the price level is the consumer price index (CPI). The CPI tells how the average price of all goods and services bought by a typical urban household changes from month to month. The major purpose of the CPI is to measure changes in the cost of living and in the value of money (Johansen, 2013). If the price of the goods rise, the cost to firms of producing final goods and services rises which makes firms to increase the prices of goods and services purchased by consumers.

Budget deficit is the state that total government expenditures exceed total government revenues. According to Metin (2012), there are two possible channels through which higher deficit lead to higher inflation. Firstly, the government's borrowing requirements normally increase the net credit demands in the economy, driving up the interest rates and crowding out private investment. The resulting reduction in the growth rate of the economy was lead to a decrease in the amount of goods available for a given level of cash balances and hence the increase in the price level. Secondly, deficit can also lead to higher inflation even when central banks do not monetize the debt when the private sector monetizes the deficits (Piontkirsky, 2014). This occurs when the high interest rates induce the financial sector to develop new interest-bearing assets that are almost as liquid as money and are risk free.

### **1.1.4 Contextual Perspective**

Uganda is a developing country therefore more susceptible to supply shocks causing high variability and disturb the consumption, investment and production behavior, moreover more government interventions in financial and goods market and macroeconomics behavior cause economic instability and market failure therefore prices do not give a correct signal about the course of actions of the economic agents in short run and long run in developing countries like Uganda (Solomon et al., 2015).

In Uganda, government deficit has been one of the topical issues in the country's historical economic problems. Specifically, government spending especially on recurrent or non-developmental is considered to have contributed extensively to the country's high inflation (Solomon et al., 2015). Since independence to the present day, the government of Uganda has consistently run its economy with a budget deficit. Whilst most applauded the deficits of the early independence years, the deficits in the last decade (2013 – 2007) have been damaging to the overall economy. Soon after independence (two to three years) the Somali government embarked on massive capital expenditure especially in infrastructure developments such as roads, schools and hospitals, to mention just a few (Alavirad, and Athawale, 2015). The main motivation was to try and redress the lack or inexistence of these basic facilities to the majority Somalis. The previous government (that is, government before 1980) regime's expenditures on these and other expenditure items were highly skewed towards the small minority race. Thus, these developmental expenditures (in the early 1980s) though they resulted in budget deficits, were however welcomed.

In all the above expenditures (especially the ones after 1997), the budget deficits in Uganda incurred were financed mostly by money printing (monetized deficits), with a small percentage (not more than five percent) financed by borrowing from the banking system (sometimes banks were commanded to lend the government). There was no meaningful (if any) foreign finance source during this period (1997 to date). The important link is that the source of finance implies a different effect of a budget deficit on inflation (Alavirad, and Athawale, 2015). Thus, overall, budget deficits in Uganda, especially in the last decade were financed through domestic means. Economically, 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 markets and high dependence on developed countries for foreign reserves (Akçay et al., 2012). Uganda's economy is not different from many other developing countries.



In fairness, the Bank of Uganda, by raising interest rates, has so far reacted successfully to developments that threaten to raise 2017 inflation above its target of 5 percent (Akçay et al., 2012). More immediately, the Bank of Uganda has indicated that it was fund any rising government domestic borrowing requirement by issuing government securities to the market, and not by central bank financing. In this case, there was no monetary financing of fiscal deficits World Bank (2016). However, a study by the Economic Policy Research Centre disagrees with this policy, by arguing that domestic borrowing by government crowds out private sector investment. Whereas controlling inflation is important, Bank of Uganda should also exploit modalities of using monetary policy instruments, such as interest rates, to stimulate private investments, exports and private sector competitiveness in 2017 (Akçay et al., 2012).

## **1.2 Statement of the Problem**

The debate concerning the relationship between inflation and the budget deficit is clearly inconclusive (Cagan, 2011). The proposed study intends to contribute to the debate for the case of Uganda. Uganda's economy has been typified by relatively high fiscal deficit for a prolonged period of time while inflation rate has been relatively low. Many studies perceive inflation to be the main cause of the deficit and as a result, several studies have been done in order to test the causal relationship between the budget deficit and inflation. However, in Uganda most of the studies have concentrated on the effects of the budget deficit on the exchange rate and the sustainability of the government deficit (Akçay et al., 2012). It's therefore important to assess the direction of causality so as to increase the understanding of the relationship between the variables. Measures to contain inflation have thus been targeting at reducing money supply, domestic borrowing and restraining government expenditures and these have not been fully successful (Bagonza 2015).

According to the central bank (Central Bank of Uganda, 2018) the government has been continuously pursuing an expansionary fiscal policy with the exception of the years 2011, 2013 and 2015. The main culprit for the expansionary fiscal stance was

increasing pressure from the public seeking to achieve faster economic growth. The government responded by expanding its expenditure on development projects and infrastructure improvements. However, when the impact of the increasing fiscal deficit was felt at the end of 2012, 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 rate achieved at the end of 1990s and early twenty first century is explained by the introduction of improved fiscal discipline. Therefore, the main aim of this study is to examine the relationship between these variables and their direction of causality in Uganda.

### **1.3 Purpose of Study**

The purpose of the study is to empirically examine the effect of inflation on budget deficit in Uganda (1991 - 2016)

### **1.4 Research Objectives**

- i. To investigate the long-run relationship between inflation and budget deficit in Uganda (1991 - 2016)
- ii. To investigate the short-run relationship between inflation and budget deficit in Uganda (1991 - 2016)

### **1.5 Research Questions**

- i. What is the long-run relationship between inflation and budget deficit in Uganda (1991 - 2016)?
- ii. What is the short-run relationship between inflation and budget deficit in Uganda (1991 - 2016)?

## **1.6 Hypothesis**

**H<sub>01</sub>:** There is no long-run relationship between inflation and budget deficit in Uganda (1991 - 2016)

**H<sub>02</sub>:** There is no short-run relationship between inflation and budget deficit in Uganda (1991 - 2016)

## **1.7 Significance of the study**

The debate and evidence on the direction of causality between inflation and the budget deficit is inconclusive and is still enduring. Some empirical studies have found a unidirectional relationship running from the budget deficit to inflation (Cagan, 2011, Akcay, Alper, and Ozmucur, 2012). While these studies provide results to support the idea that inflation is caused by deficits, other economists argue the reverse. These argue that there is actually a unidirectional association between these variables specifically running from inflation to deficits

In different studies however, some scholars do not find significant evidence of the direction of causality between inflation and the budget deficit. This implies that neither inflation nor budget deficit granger causes the other. On the other hand, other studies find bidirectional causation between inflation and budget deficits. These argue that there is a self-strengthening process which may well destabilize an economy and lead to a very high inflation.

There is thus a need to contribute to the debate and fill this gap by investigating the causal relationship between these variables so that developing countries including Uganda can employ the right policies after knowing the direction of causality between budget deficit and inflation. It is therefore necessary for the policy makers to recognize this so as to ensure sustainable and rightful policy implementation. The study therefore provides policy options for the government policy budgetary operations that are less

inflationary. The results of this study also enhance acquaintance of the repercussions of budget deficit on inflation in Uganda.

## **1.8 Scope of the study**

The study concentrates on investigating the links between inflation and the budget deficit in Uganda for the study period 1991-2016. This period of study was chosen because of the availability of reliable data for analysis and not by arbitrary selection.

### **1.8.1 Geographical scope**

The study was conducted in Uganda using time series data of inflation and budget deficit from 1991-2016. Uganda is located within both the east and central African regions. As a member of regional groupings, Uganda's access to trade and investment is enhanced. For example, it is a member of the Common Market for Eastern and Southern Africa (COMESA) which has a population of about 400 million persons, and in November 1999, it signed a treaty establishing the East African Community. The EAC market, comprising Kenya, the United Republic of Tanzania and Uganda has a total population of 74 million.

### **1.8.2 Content scope**

This study examined independent variable inflation and budget deficit as the dependent variable.

### **1.8.3 Time scope**

This study used time series data from 1991-2016.

## **1.9 Organization of the study**

This dissertation is organized in five chapters, Chapter one outlines the background, problem statement, objectives, hypotheses, significance and scope of the study. Chapter two discusses both the theoretical and empirical literature. The mechanisms

regarding the relationship between the budget deficit and inflation have also been highlighted. Chapter three presents the Methodology that was adopted by this study. Data analysis, discussion and interpretation of results have been presented in Chapter four while Chapter five gives the summary of conclusions that have been drawn from the findings of the study as well as the policy recommendations.

### 1.9.1 Operational Definitions of Key Terms

<b>Variables</b>	<b>Definitions</b>
<b>Gross Domestic Product</b>	The aggregate monetary value of all final goods and services produced annually within the boundaries of a country.
<b>Government budget deficit</b>	This is a situation where public expenditure exceeds public revenue and it is an indicator of the financial health of the country. The government generally uses the term budget deficit when referring to spending rather businesses or individuals.
<b>Exchange rates</b>	Exchange rates is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in relation to another currency.
<b>Foreign Direct Investment</b>	Is any investment which is profit motive made by a foreign company or individual in one country for business interests in another country, in the form of either establishing business operations or acquiring business assets in the that country, such as sense of ownership or regulating interest in a foreign company.
<b>Interest rates</b>	An interest rate is the amount of interest due per period, as a proportion of the amount lent, deposited or borrowed called principal sum.
<b>Inflation</b>	Inflation is the rate at which the general level of prices for goods and services is changing with respect to the foreign currencies; and consequently, the purchasing power of currency is deteriorating. Or it is a persistent increase of the general prices of the economy.

**Source: Researcher 2019**

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews both the empirical and theoretical literature. It starts by highlighting the theoretical links between inflation and budget deficit, including the monetarist perspective, the traditional approach, the Ricardian Equivalence and the Olivera-Tanzi effect and conceptual framework. The last section of this chapter provides a synthesis of empirical literature review.

#### **2.2 Theoretical Review between inflation and budget deficit**

Different theories have given various views regarding the relationship between inflation and budget deficit. While some support the unidirectional relationship, others have argued that there is actually no relationship. On the other hand, others argue that there is bidirectional causation between the variables. This section therefore gives a critical and analytical discussion regarding the theoretical links between the budget deficit and inflation. These theories include the monetarist perspective, the traditional approach, the Ricardian Equivalence and the Olivera-Tanzi effect.

##### **2.2.1 The Monetarist Perspective**

Within the monetarist viewpoint, money supply drives inflation. If monetary policy is accommodative to a budget deficit, money supply continues to go up for a long time. Aggregate demand increases as a consequence of this deficit financing causing output to increase above the natural level of output. Growing labor demand increases wages, which in turn leads to a shift in aggregate supply in a downward direction. After sometime, the economy returns to the natural level of output. However, this happens at the expense of permanent higher prices. According to the monetarist view, budget deficits can lead to inflation but only to the extent that they are monetized (Alavirad

and Athawale, 2015). In the monetarist models, changes in the inflation rate closely depend on changes in the money supply. Generally, the budget deficit does not cause inflationary pressures but rather affects the price level through the impact on money aggregates and public expectations, which in turn trigger movements in prices. The money supply link of causality rests on Milton Friedman's famous theory of money which indicates that inflation is always and everywhere a monetary phenomenon (Alavirad and Athawale, 2015).

The theory explains that continuing and persistent growth of prices is necessarily preceded by a sustained increase in money supply. The expectations link of causality works through the inter-temporal budget constraint which implies that a government with a deficit must run in present value terms, future surpluses (Cagan, 2011). One possible way to generate surpluses is to increase the revenues from Seigniorage so that the public may expect future money growth. The monetarist view of the link between the budget deficit and inflation is a unidirectional relationship between these variables. These proponents argue that it is the budget deficit that leads to inflation through changes in the in the monetary aggregates and expectations implying that the budget deficit is not directly related to inflation.

### **2.2.2 The Olivera-Tanzi effect**

It appears that the inflation-budget deficit link in fact exhibits a two-way interaction. That is, not only does the budget deficit through its impact on money aggregates and expectations produces inflationary pressures, but high inflation also has a feedback effect pushing up the budget deficit. Basically, this process works due to significant lags in tax collections (Catao and Terrones, 2014). The problem lies in the fact that the time of tax obligation's accrual and the time of actual tax payment do not coincide with payment usually made at a later date. We may therefore have the following self-strengthening phenomenon. Persistence of budget deficit props up inflation which in turn lowers real tax revenues, a fall in the real tax revenues then necessitates further increases in the budget deficit and so on. In economic literature, this is usually referred

to as the Olivera-Tanzi effect. Hamburger and Zwick, (2013) actually show with the evidence from developing world in the 1980s and support the conclusions that this self-strengthening process may lead to further increase in inflation.

### **2.2.3 The Traditional Approach to Fiscal Policy**

The traditional view contends that, given the level of government expenditure, increases in the government debt was stimulate consumption and demand and then induces inflationary pressures. This macroeconomic model asserts that, a government substation of budget deficit for tax revenues was raise aggregate consumer demand level (Hamburger and Zwick, 2013). The argument in this case is that, for a given level of government expenditure, as the budget deficit rises, disposable income also rises leading to an increased level of consumption by these households. With a given level of output, an increased aggregate demand level will generate inflationary pressures on the economy. The traditional approach therefore believes in the unidirectional causation running from the budget deficit to inflation. This occurs through increase in aggregate demand caused by an increase in disposable income which arises as the budget deficit increases.

### **2.2.4 The modern approach to fiscal policy: "The Ricardian Equivalence Approach"**

This theorem postulates that future taxes implied by government debt cancel any wealth effects of the debt preventing all the effects predicted by the traditional view (Johansen, 2012). The central preposition by this theorem regarding the effects of different mechanisms of financing public expenditures is that, under specific circumstances, it makes no difference to the level of aggregate demand if the government finances its expenditures by debt or taxation.

When the economy is in the short run full employment equilibrium, debt financing does not affect the path of prices (Johansen, 2012). This theorem argues that it does not matter whether the government expenditure is tax financed or bond financed because



of the presence of intergenerational transfers so that the public equates the current value of the bonds with the future value of the tax liabilities generated by bonds. This means that as opposed to the traditional view, according to this theorem, economic agents fully anticipate the effects of the budget deficit and therefore do not change consumption patterns and thus the net effect of the economy is zero. This implies the budget deficit has no effect on inflation (Metin, 2012). Some empirical studies have been done and have been in favor of the Ricardian Equivalence, for example, Johansen, (2012) found that the choice between debt finance and tax finance of the government deficit is irrelevant in the determination of macroeconomic variables including inflation. However, other studies have found no evidence of a positive association of the budget deficit and inflation.

The Ricardian equivalence has shortcomings because of its unrealistic assumptions. For example, it assumes that the economic agents have a perfect foresight of the future government decisions and therefore are able to anticipate the future effects of the budget deficit. In a developing country like Uganda which is characterized by market imperfections, the Ricardian Equivalence fails in the presence of capital market imperfections (Johansen, 2012). The Ricardian Equivalence requires that the individuals be effectively linked through an operative intergenerational bequest motive. When this intergenerational link is broken, government bonds become net worth and therefore have effect on the economy (Piontkirsky, 2014). Although there are many reasons why Ricardian Equivalence may fail to hold in practice, its breakdown does not necessarily mean that it is obvious that a relationship exists between the inflation and the budget deficit which is the main objective of this study.

### **2.3 Sources of deficit finance**

According to the monetarists' perspective, inflation is driven by money growth. It suggests that the determination of the price level is associated with high rates of money growth. More specifically, changes in money supply executed in a way that does not lead to changes in the output was be associated with proportionate changes in prices.

According to the famous Friedman's assertion "inflation is always and everywhere a monetary phenomenon"; However, the world is more complicated than this and monetary policy consists of more than just currency exchanges. In order to understand how the government borrows funds to finance the deficit, the study uses the theoretical model borrowed from Solomon et al. (2015). In order to finance the deficit, the government may get money from the system say by printing more currency. Literally, the government pays its bills with currency. In another way, the government gets currency into the economy by changing the composition of its balance sheet, which is changing the proportion of interest bearing debt with non-interest bearing debt. If the government can neither reduce deficit nor issue debt, the only alternative left is to print money.

Whenever the central bank prints "fresh money", it obtains goods and services in exchange for these new pieces of paper, 'the seigniorage'. In real terms seigniorage can be expressed as the ratio of new currency printed during the period to the price level during the same period (Alavirad and Athawale, 2015). This gives a twist to Friedman's assertion that inflation might be a monetary phenomenon but the money reflects fiscal policy and not monetary. An imperative question that arises is why inflation a fiscal phenomenon? If inflation was purely a monetary phenomenon caused in the first place by an exogenous excessive rate of growth of money, economies could have reduced inflation quite fast by printing less money thus reducing the growth rate of money supply. Instead, all countries that only used the monetary policy have had really a hard time in reducing their inflation rates. Depending on the magnitude of government's borrowing requirement, financing of its deficit would have significant impact on the economy which includes inflation. Closely corresponding to the above version, Cagan, (2011) argue that there exists five different ways of financing budget deficits, that is; Borrowing from the central bank (monetization of the deficit), Borrowing from the rest of the banking system, borrowing from the domestic non-bank sector, borrowing from abroad or running down foreign exchange reserves and accumulation of Arrears

### **2.3.1.1 Government borrowing from the central bank**

Borrowing from the central bank can also be called monetization of the deficit. This is because; this method always leads to growth of the monetary base and money supply. It's often referred to as just "printing money ". Monetization occurs when; the central bank directly finances deficit by lending funds needed to pay government bills (Cagan, 2011). Or the central bank purchases government debt at the time of issuance or later in the course of open market operation.

If the central bank just lends or purchases newly issued government debt, it simply pushes up the stock of high-powered money. It may also be the case that the government first borrows from the public or the commercial banking system (Catao and Terrones, 2014). However, if the central bank then intervenes and either buys out the debt from the public by means like open market operation or accommodates additional demand for liquidity from the banking systems, the equivalent amount of reserves gets injected in to the economy as if the government originally borrowed from the central bank. In either case the budget deficit is financed leads to an increase in high powered money and thereby inflation.

### **2.3.1.2 Government borrowing from abroad**

Externally, governments borrow money from international financial markets. It is an established fact that external borrowing for financing deficits affects the general price level through the changes in the relative prices of domestic and foreign currencies (Hamburger and Zwick, 2013). Exchange rate depreciation can increase the price level of imported commodities. Uganda is highly dependent on imported commodities like most developing countries. The implication is that the depreciation of the exchange rate could immediately be reflected on an increase of the price consumer's basket of commodities (Johansen, 2012).

### **2.3.1.3 Government borrowing from the public**

Borrowing from the public can be exercised either domestically or internationally. The ultimate domestic purchases of government debt as pointed out by Johansen, (2012) could be Non-bank public or Bank. The essential difference comes from the likely impact of the operation on money supply and inflation.

If government debt is acquired by non-bank domestic public and then the government immediately spends the proceeds by paying its bills, then monetary base remains unchanged and there is no influence on money supply and thus no room for inflation (Metin, 2012). However, borrowing from the public by issuing debts might cause certain inconveniences for policy makers for example bond finance of budget deficit may push up interest Rates thereby putting pressure on private sector finance. Additionally, the cost of borrowing at such high rates surely increases debt service payments thus adding to future budget expenditures (Piontkirsky, 2014).

If banks acquire the government debt, the consequences with respect to monetary base and money supply may differ. No doubt government borrowing puts additional pressure on banks reserves and banks may demand more liquidity from the central bank (Piontkirsky, 2014). If such an extra demand for credit from banks is accommodated and the central bank supplies banks with additional reserve, then in fact monetary base increase, thereby causing a rise in money supply through deposit multiplication and thus fuelling inflation. However, if the central bank does not accommodate the extra demand, there was be no effect on monetary growth and hence inflation. Banks would be forced to reduce credit to the private sector in order to meet higher demand for government credit by purchasing debts ((Piontkirsky, 2014). Thus the effect of this would be crowding out of the private spending. It would thus have no effect on inflation.

#### **2.3.1.4 Running down foreign reserves**

Financing of the budget deficit by running down foreign reserves occurs when the central bank first purchases government debts on primary and secondary markets (or simply grants a loan to the government (Solomon et al., 2015) thereby injecting additional reserves to the economy and then trades available foreign reserves for domestic currency to offset the increase of monetary base and money supply. As long as the foreign reserves are available, the government can confidently finance the deficit. However, when foreign reserves dry up and approach the level the private sector believes to be critical, the result can be capital flight and the exchange rate depreciation that adds to the inflationary pressure (Alavirad and Athawale, 2015).

#### **2.3.1.5 Accumulation of arrears**

Many contemporary researchers argue that there exists a special form of dealing with budget deficit that in essence aims at hiding it (Alavirad and Athawale, 2015). In practice, the part of government spending gets deferred through the accumulation of arrears and is supposed to be disbursed later in coming fiscal years. Government expenditure (arrears) which indicate delays in government payment to suppliers or creditors have become an important fiscal issue in many transitional economies.

Arrears can lead to under estimates of spending and of the size of the fiscal problem facing a country (Alavirad and Athawale, 2015). Since arrears are a form of forced deficit financing, the government's borrowing requirement is also understated, which leads to a distorted picture of the sources of credit expansion in the economy. While deficit financing can allow the government to absorb more of the economy's resources than would otherwise be possible, this initial effect is offset as the rest of the economy responds by raising suppliers prices or holding back payments for taxes and fees. Unfortunately, expenditure arrears raise the cost of providing government services (Cagan, 2011).

Arrears may also adversely affect the private sector's expectation about the future development of the economy. Economic agents may thus anticipate an increase in tax pressure, higher inflation as well as overall deterioration of financial conditions (Cagan, 2011). These negative expectations are likely to amplify the conventional 'deficit-money-inflation' effects that we have already reviewed. Furthermore, the arrears accumulated in previous periods may pose a threat to be carried over to the future period thus only postponing inflationary pressure (Cagan, 2011).

### **2.3.2 Inflation and budget deficit Relationship in Different Economic Thoughts**

There is a considerable debate on budget deficits and its inflationary effects in economic theory literature. In the period of 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 (Catao, and Terrones, 2014). The underlying reason is that when budget expenditures increase, aggregate demand curve responds it by shifting right, leading to an increase in both prices and production assuming aggregate supply is not perfectly elastic/ inelastic.

The increasing nominal income was come up with rising transactional demand for money, which is compensated by speculative demand for money, that is; increasing real interest rates (Hamburger and Zwick, 2013). In the Keynesian economic thought, the budget deficits can be tolerable in the crisis times. Moreover, Keynes saw the budget deficits as an indicator of the impact of fiscal policy on aggregate demand. Thereby, due to the fact that the budget deficit can affect economic performance, it has been perceived as an endogenous factor. As a result, in Keynesian theory, because the main aim of the governments is to sustain high overall economic performance in the long run, the budget deficits can be acceptable to some degree (Johansen, 2013).

In the neoclassic theory, the debate of Sargent and Wallace enlightens the discussion on the relationship among fiscal imbalances and inflation. Sargent and Wallace discuss two types of the coordination between monetary and fiscal authorities which is effective in controlling the inflation. In the first type of coordination in which the monetary authority is dominant, monetary authorities announce the monetary base growth and fiscal policy sets its budget by considering the revenue created by monetary policy. In the second type of coordination, in which the fiscal authorities are dominant, fiscal policy sets its budget and announces the amount of money needed for monetary authorities through seigniorage and bond sales (Metin, 2012).

Most of these studies have been using single equation models where inflation is treated as an endogenous variable and the budget deficit as an exogenous variable among other variables using ordinary least squares (OLS) estimation technique. However, this approach rules out the possibility of bidirectional causation. Recent studies for example by Solomon (2015) in Tanzania used the Cointegration and Error Correction Model (ECM) but concentrated on whether the budget deficit leads to inflation and ignored the aspect of feedback which can be done by making inferences using the short run and long run Granger causality within the framework of Vector Error Correction Model (VECM). This therefore forms the basis of this study.

## **2.4 Empirical Literature**

Several studies have been conducted to establish the relationship between inflation and budget deficit both in developed and developing countries. However, some of these studies are hereby presented.

Attiya et al, (2011) examined the effects of fiscal policy on government budget deficit shocks between 2017-2019. The study employed VAR as estimation technique. Findings from the study revealed that an expansionary fiscal policy shock improves the current account and depreciates the exchange rate.

Areomo, Orisadare & Ekperiware, (2018) examined oil price shock and fiscal policy management in Nigeria. The used (SVAR) as estimation technique. Findings from the study showed that oil price shocks affect Government financing negatively.

Cyril, (2019) studied the impact of Inflation on growth performance in Numbia. The study employed ordinary least square as estimation technique. Findings revealed that inflation was counterproductive especially if not controlled.

Darrat, (2017-2019) re-investigated the inflationary effects of budget deficits. Darrat results showed that besides money growth, higher budget deficits played an important and direct role in Greek inflationary process.

John, (2018) examined the nexus between inflation and budget deficit in South Africa between 2017 and 2019SS The study employed vector Autoregressive Distributive model as estimation technique. The study employed VAR and Granger causality as estimation techniques. Findings showed that the two variables responded positively and significantly to each other. Also, the causality that runs between the two variables in bi-directional.

Okoye, Evbuomwan, Modebe & Ezeji (2016) used annualized Nigeria's data spanning 1981 – 2014 obtained from publications of the Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS) to investigate impact of key macroeconomic indicators on fiscal deficits in Nigeria. Exchange rate, inflation rate, unemployment rate and gross fixed capital formation made up the independent variables, while fiscal deficit was used as dependent variable. Vector error correction model (VECM) served as the technique of analysis. Results revealed significant positive effect of gross fixed capital formation, and significant negative impact of inflation rate including unemployment rate on fiscal deficits in Nigeria within the period under review. Finally, the exchange rate showed negative and non-significant effect on fiscal deficits. The results aforementioned mean that existing policies targeting at uplifting the infrastructure level of the country seem to engender deficit budgeting. Likewise, economic policies that



seem to control inflation (such as increasing GDP level) and unemployment result in increased budget deficits. The causality tests indicate proof of causal effect of government budget deficits on exchange rate, inflation rate and unemployment rate, but failed to display sign of causation between fiscal deficit and gross fixed capital formation.

Olasunkanmi and Babatunde, (2013) studied the effect of fiscal policy shocks on the current account as well as the dynamic interactions among fiscal policy shocks and current account with other macroeconomic variables. The results from this study showed that the expansionary fiscal policy shock had a positive effect on output, exchange rate and negative impacts on Current account balance and interest rate.

Obinyeluaku & Vieg, (2009) investigated the oil revenue shocks and fiscal policy in Nigeria. The study employed VAR as estimation technique. Result showed that expansionary fiscal policy did not in any way improve macroeconomic performance of Nigerian Economy during the study periods. Conclusively, as far as above empirical literature is concerned, there is an element of compatibility in the results and findings. However, majority of these studies were country specific. This study is out to examine budget deficit/inflation nexus in the two largest economies in Africa running a different model for each of the countries.

To further establish the relationship between inflation and budget deficit, Omncia, (2008) investigated the short-run dynamics and long-run relationship between budget deficit, its sources of financing and inflation in Egypt using annual data between 1981 and 2006). Finding from the study showed that Johansen cointegration analysis suggests that in the long-run, inflation is not only related to the budget deficit but also to its sources of financing real output growth and the exchange rate.

Solomon, (2004) examined the effect of inflation on budget deficit in Tanzania. The study employed co-integration and Error Correction as estimation technique. Results

showed that the causal that run from the inflation rate to budget deficit was uni-directional.

Saeidi & Valizadeh (2012) examined impact of budget on inflation and unemployment in Iran's economy. The theoretical foundation of the study was the Keynesian hypothesis. OLS and LS square were used to estimate the parameters contained in the three models adopted by the researchers to measure the impact of each independent variable on dependent ones. The results revealed that budget deficit had a positive influence on inflation and unemployment in Iran. The implication is that Keynesian theory is prevalent in Iran's economy. The authors concluded that general price levels, inflation and unemployment rates remained critical variables of macroeconomy, which promoted growth. They added that sound policy making guaranteed desirable rate of inflation and unemployment, stressing that budget constituted the primary instrument available to government for policy making.

In Turkey, similar study was carried out by Tekin, Korux & Ozman (2003). That examine the interrelationship among budget deficits, money growth and inflation. The study made used of tri-variates system containing money Growth, budget deficits and Inflation. Findings from the study confirmed the quantity theory of money that any change in the quantity of money will change prices as well in a more elaborate study.

According to Easterly, William R., Paolo Mauro and Klaus Schmidt-Hebbel (1995), studying inflation is different from studying money supply, especially for developing and high inflation countries, Aisen and Verga (2007) corroborated Easterly et al (1995), the correlation between inflation and budget deficit in their study fluctuates significantly depending on the rate of inflation. While it is positive most of the time and for most of the countries, it declines with the level of inflation and becomes negative for inflation rates above 400% per year. Thus, it is misleading to assume that the determinants of inflation are necessarily the same as those of budget deficit.

Tekin-Koru and Ozmen (2003) investigated the long-run relationships between inflation and budget deficit in Turkey considering two alternative tri-variate systems corresponding to the narrowest and the broadest monetary aggregate. They found that while the joint endogeneity of money and inflation rejects the validity of the monetarist view, lack of a direct relationship between inflation and budget deficits makes the pure fiscal theory explanation illegitimate for the Turkish case. Consistent with the policy regime of financing domestic debt through commercial banking system, budget deficits led to a growth not of currency but of broad money in Turkey. This mode of deficit financing, leading to a creation of near money and restricting the scope for an effective monetary policy, may not be sustainable, as the government securities/broad money ratio cannot grow without limit.

In addition, Chaudhary and Parai (1991) used a rational expectations macro model of inflation to find out the effect of the anticipated inflation and budget deficit for the Peruvian economy. They concluded that the country's huge budget deficit as well as high rates of growth of money did have a significant impact on the inflation rate.

Mohammad and Naved (1995) studied money supply, inflation and budget deficit in Pakistan based on the monetarist and quantity theory approaches to inflation and came out with the findings that suggested that the domestic financing of budget deficit particularly from the banking system, is inflationary in the long run. The results provided support for a positive relationship between budget deficit and inflation during acute inflationary period, i.e. 1970s. They also found that money supply is not exogenous rather it depends on the position of international reserves and fiscal deficits.

Chimobi and Igwe (2010) posited that there was a long-term relationship between inflation and budget deficit. It also indicated that money supply in the Nigerian economy determined the extent of budget deficit.

Poterba and Rotenberg (1990) provided some cross- country evidence on the joint movements of inflation and other tax revenue. In general, their result is not favorable

to the hypothesis that money supply has been set on the basis of optimal finance considerations. Although, they found that there exists a positive relationship between tax rates and inflation for the United States and Japan, while it is a negative relationship for France, Germany and the United Kingdom.

Omoke and Oruta (2010) analyzed the causal long-term relationship between budget deficit, money growth and inflation in Nigeria. The results point to a close long-term relationship between inflation and money supply. With regard to the role of the fiscal deficit, the VEC estimates provide evidence that a one percentage increase in the fiscal deficit (as a share of GDP) leads to an increase of almost 0.94 percent in the money supply (M2) growth rate. The results from the test indicated that Money supply causes fiscal deficit which means that the level of money supply in the Nigerian economy determines whether there has been or there will be fiscal deficit. Inflation and budget deficit revealed a bilateral/feedback causality proving that the changes that occur in inflation could be explained by its lag and also the lag values of budget deficit; in the same vein changes that occur in budget deficit is explained by its lagged values and the lagged values of inflation.

Cevdet, Emre and Suleyman (1996) used annual Turkish data to analyze the existence of a stable long-run relationship between inflation and budget deficits; and the results according to them was affirmative but concluded that a significant impact of budget deficits on inflation could not be refuted under the assumption of long-run monetary neutrality. However, utilizing an unrestricted VAR model using quarterly data corresponding to the post-bond financing period, the results were suggestive of a weakened link from the other variables to inflation. A further check using an ARIMA approach validated the same result and it is shown that the inertia in the inflation process was increasing over time.

De Haan and Zelhorst (1990) analysed the relationship between inflation and budget deficit in the developing countries. The overall conclusion of their study did not provide much support that government budget deficit influences monetary expansion and, therefore, create inflation.

## **2.5 Research Gaps**

This study will employ error correction model to investigate the nature and the direction of the relationship between inflation and budget deficit in Uganda in which the researcher had found out during reviewing the related literature that hardly the past researchers had employed to check the speed of adjustment after a shock ( $ect_{-1}$ ). Nurudeen, A & Usman A (2010).

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.0 Introduction**

This chapter outlines the methodological approach to the analysis of the causal relationship between the budget deficit and inflation in Uganda. It begins by specifying the theoretical framework and the empirical model, the estimation procedure as well as the sources and the types of the data to be used in the analysis.

#### **3.1 Research design**

The study employed Ex-post research design is design also often applied as a substitute for true experimental research to test hypotheses about cause-and-effect relationships or in situations in which it is not practical or ethically acceptable to apply the full protocol of a true experimental design. Despite studying facts that have already occurred, ex post facto research shares with experimental research design some of its basic logic of inquiry.

#### **3.2 Theoretical Framework and Empirical Model Specification**

The impact of government budget deficits on inflation rate can be thought of through different channels. Higher government budget deficits result in higher interest rate which then leads to lower domestic investment. Crowding-out effect of deficits will eventually translate into a lower formation of capital and lead to a lower aggregate supply and a higher price. However, the impact of deficit on interest rates is still debatable. For example, Bradley (1986) lists twenty-one studies on the deficit-interest rate link and finds that only four provided supporting evidence for a positive and statistically significant impact of the deficit on interest rates. The rest of the studies find either no evidence of a significant impact or produces mixed results, including the absence of any linkage between the variables. The literature on the deficit-interest rate

link for a small-open economy under capital mobility is limited to theoretical studies. Empirical studies pertain to either large open, or closed economy models.

The second channel is the wealth effect of deficits/debt financing. When deficits are financed by issuing bonds and bondholders do not consider bonds as future taxes (a non-Ricardian view), the wealth of the nation is perceived to have gone up. A higher wealth effect increases the demand for goods and services and drives prices up. However, Tekin-Koru and Ozmen (2003) find no support for the linkage between the budget deficit and inflation through the wealth effect in Turkey. Instead, they found that deficit financing leads to a higher growth of interest-bearing broad money, but not currency seigniorage. The third channel in which government budget deficit and debt financing can affect the inflation rate is through the monetization of the deficit. Generally, budget deficit per se does not cause inflationary pressures, but rather affects price level through the impact on money aggregates and public expectations, which in turn trigger movements in prices.

The model to be used in this study was borrowed from Solomon De Wet (2015) and Catao and Terrones (2014). This model links reactions of the government deficits to inflation as was developed by Aghevli and Khan (1977, 1978). The basic model involves five equations; the price equation, government expenditure and revenue equations, and the supply of money equation. A definitional equation explaining the formation of expectations is the fifth. In its extended form, the model developed by Aghevli and Khan (1977, 1978) is based on equations for four factors: price, government expenditures, revenue and money supply. These are described below.

### **3.3 Model Specification**

The transmission mechanism between inflation and budget deficit is somehow a difficult one to establish for certain reason. First, empirical studies trying to capture the link between these two variables are bound to produce results that are quite sensitive to the choice of the model being used when one considers the number of possible versions

that can be constructed. Most of these studies used the inflation model, while a few used a tri-variate system (John, 2013) Based on the issue raised above and in conclusion with theoretical framework, the below model is being specified to capture the relationship between inflation and Budget Deficit in Uganda.

$$GBD = \beta_0 + \beta_1 INF_t + \beta_2 EXR_t + \beta_3 FDI_t + \beta_4 IRR_t + \beta_5 GDP_t + \mu_t \quad 3.1$$

Where

INF= Inflation

GDB = Government Budget Deficit.

IRR= interest rate

GDP = Growth Rate of Gross Domestic Product.

EXR = Exchange Rate.

FDI = Foreign Direct Investment

t: time bound

### 3.4 Sources of data and data types

The data type would be time series data attained through secondary data sources from the publications of statistical abstracts. The time series analysis involves the methods for assessing the time series in the order of extracting the meaning and the data characteristic. The time series design in this case base on the assessment of the historical data (Kothari, 2005), the available source of the provisions in this case is OECD Statistics, World bank and WEO. Time series analysis is used when the data or information required for the study is available and reliable. Time series data was used in this study. The data used will be collected among time series available in the World Bank development indicators from 1991 to 2016 and world economic outlook.



### 3.5 Co-integration

The variables used in the study was be tested for co-integration in order to establish if there existed a long run relationship between the series. If the variables in equation (9) have stochastic trends and follow a common long-term equilibrium association, then the variables are said to be co-integrated. Co-integration is a test for equilibrium between non-stationary variables integrated of the same order. The Johansen's co-integration procedure (1990) is adopted for this study because it involves the use of a well-established, likelihood ratio statistics. The equation for testing co-integration using Johansen's procedure is as below;

$$y_t = \alpha + A_t y_{t-1} + ..... + A_p y_{t-p} + \varepsilon_t \quad (3.2)$$

Where  $y_t$  is k-dimensional vector of non-stationary variables, and  $\varepsilon_t$  is a vector of white noise-residuals. By using the first difference operator  $\Delta$  equation (15) can be rewritten as;

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^p T_i \Delta y_{t-i} + \varepsilon_t \quad (3.3)$$

The rank of matrix  $\Pi$  determines the number of linear combinations of  $y_t$  that are stationary processes. If the rank of the matrix is  $r$ ,  $\Pi$  can be factored as  $\alpha\beta$ , where the elements of  $\alpha$  are the adjustment parameters in the error-correction model, and  $\beta$  contains the co integrating vectors. Johansen derives two test statistics for testing the co-integrating rank. The first is the maximum eigenvalue test while the second is the trace statistic.

The Johansen's Cointegration test was therefore be carried out. This was be done in order to test the rank or number of cointegrating relations as opposed to the Engle Granger Methodology which only assumes one cointegrating equation regardless of the number of the series. The Johansen's (1988) methodology allows us to estimate

multiple long run relationships between a series of non-stationary variables through cointegrating vectors as well as many short run dynamics in these variables in the Error Correction Model (ECM).

### 3.6 Error Correction Model Specification

If evidence of co-integration is observed between budget deficit and inflation, it would imply that there exists a short-term equilibrium relationship between them, so Error Correction Model would be estimated to evaluate the short run properties of the Co-integrated series because we are interested in uni-variate analysis. ECM leads to better understanding of the short-term interaction between different stationary series. It describes a system in which each variable is a function of its own lag, and the lag of the other variable in the system.

The Error Correction Model is used in this study to capture the short and long run impact of budget deficit on inflation. The method involves developing a model from its Generalized form (over parameterized) to a specific form (parsimonious) using the Hendry modeling approach. It is also adopted in that it accounts for the speed of adjustment to equilibrium after a shock ( $ect_{t-1}$ ).

The Error Correction Model (ECM) takes the form:

$$\Delta Y_t = a_0 + \sum_{i=1}^j \alpha_{1i} \Delta Y_{t-i} + \sum_{i=1}^j \alpha_{2i} \Delta X_{it-i} + \alpha_3 ect_{t-1} + u_t \quad (3.4)$$

Where the long run properties are derived from the proportionality between  $y_t$  and  $X_{it}$ . The above specification relates the short run change in the dependent variable  $\Delta y_t$  to the short run change in the explanatory variables  $X_{it}$ . This is called the impact effect ( $\alpha_{2i}$ ) but ties the change to the long run impact through a feed-back mechanism.

## **CHAPTER FOUR**

### **DATA PRESENTATION, ANALYSIS AND INTERPRETATION**

#### **4.0 Introduction**

In this chapter, the researcher presents analyses and interprets the data. The presentation, analysis and interpretation of the data are dependent on the purpose of the study: To determine the effect of inflation on budget deficit in Uganda from 1991-2016. The study objectives were to investigate the long run relationship between inflation and budget deficit 1991-2016, to investigate the short run relationship between inflation and budget deficit 1991-2016, The presentation, analysis and interpretation are shown below.

In addition, the co-integration techniques are discussed to in an attempt to find out the long run relationship between inflation and budget deficit in Uganda (1991-2016). Furthermore, econometric techniques that are discussed in the previous chapter are employed in this chapter and the results are discussed in detail.

The initial part of this chapter deals with descriptive summary of the data. This can be used to evaluate the scores of each variable for more advanced statistical analysis and the data can easily be understood in the form of tables and graphs.

In the next sub-sections of the chapter unit root tests are performed using the Augmented Dickey Fuller (ADF) and Phillip Perron (PP) tests. The results of these stationarity tests were then led to the testing of long-run relationship between the variables understudy. The long-run relationship is captured using Johansen co-integration tests.

## 4.1 Data preliminary testing

Before using the data in the analysis, several diagnostic checks and tests were conducted to find out the statistical behavior of all the variables. This is important since for data to be used in any analysis, its integrity and reliability should be ascertained as well as finding out if the data is normally distributed.

### 4.1.1 Descriptive Summary

**Table 4.1: The Summary Statistics for the Series of the Data Set**

<b>Statistic</b>	<b>GBD</b>	<b>INF</b>	<b>GDP</b>	<b>EXR</b>	<b>FDI</b>	<b>IRR</b>
<b>Mean</b>	1.328	9.161	6.581	2.933	3.247	2.184
<b>Median</b>	1.205	6.350	6.365	2.941	2.890	2.395
<b>Maximum</b>	2.580	52.400	11.520	3.194	6.480	3.049
<b>Minimum</b>	0.280	-0.300	3.140	2.733	0.030	-0.341
<b>Std. Dev.</b>	0.668	10.680	2.271	0.142	1.599	0.746
<b>Skewness</b>	0.276	2.850	0.420	0.247	0.133	-1.594
<b>Kurtosis</b>	1.990	11.697	2.327	1.918	2.975	6.085
<b>Jarque-Bera</b>	1.434	117.163	1.254	1.533	0.077	21.321
<b>Probability</b>	0.487	0.000	0.534	0.464	0.961	0.000
<b>Sum</b>	34.550	238.200	171.130	76.281	84.430	56.799
<b>Sum Sq. Dev.</b>	11.166	2851.942	129.009	0.504	63.951	13.919
<b>Observations</b>	26	26	26	26	26	26

**Source: Output from E-views 7**

Where:

GBD: Government Budget Deficit

INF: Inflation Rate

GDP: Gross Domestic Product

EXR: Exchange Rate

FDI: Foreign Direct Investment

IRR: Interest Rate

In the findings of descriptive statistics from the above table, the mean, median, maximum, minimum values and standard deviations of the considered variables are exposed. When this study compared the descriptive statistics among variable, while budget deficit had the lowest mean value of 1.328 and inflation had 9.161. Likewise, GDP growth had a mean value of 6.581, the other variables of exchange rate had a mean value of 2.933 and FDI with the mean of 3.247. and interest rate was having mean of 2.184. In terms of the standard deviation on the major variables, inflation had 3.26240 rate had the highest standard deviation 10.680 while EXR had the lowest standard deviation of 0.142. The maximum value for INF rate was 52.400 percent, while for budget deficit 2.580 percent. EXR rate had standard deviation of 0.142, FDI had standard deviation of 1.599, while interest rate had standard deviation o0.746f. The lowest minimum value is recorded in INF rate (-0.300).

#### **4.1.2 Test for Normality**

The variables used in the model were tested for normality to ascertain if the spurious results in the model above were due to non-normality of the variables. This was tested using Jarque-Bera statistic and the results are presented in the Table 4.2.

**Table 4.2: Test for normality**

<b>Statistic</b>	<b>BD</b>	<b>INF</b>	<b>GDP</b>	<b>EXR</b>	<b>FDI</b>	<b>IRR</b>
<b>Skewness</b>	0.276	2.850	0.420	0.247	0.133	-1.594
<b>Kurtosis</b>	1.990	11.697	2.327	1.918	2.975	6.085
<b>Jarque-Bera</b>	1.434	117.163	1.254	1.533	0.077	21.321
<b>Probability</b>	0.487	0.000	0.534	0.464	0.961	0.000
<b>Sum</b>	34.550	238.200	171.130	76.281	84.430	56.799
<b>Sum Sq. Dev.</b>	11.166	2851.942	129.009	0.504	63.951	13.919
<b>Observations</b>	26	26	26	26	26	26

***Source: Output from EViews7***

Normality test results in Table 4.2 show that only Inflation (INF) and Interest Rate (IRR) were normal at 5% level of significance but all the remaining variables in the study were not normal since their Jarque-Bera probabilities are greater than 0.05, the level of significance. We fail to reject the null hypotheses that they are normal. Therefore; we shall log the variables prior to their use in the subsequent tests.

#### **4.1.3 Test for Stationarity**

The variables were tested for stationarity using the Augmented Dickey Fuller (ADF) and Phillip Perron (PP) statistics. Results of the tests for stationarity are presented in the Tables 4.3.

**Table 4.3: Stationarity Test Result**

<b>Augmented Dickey Fuller (ADF)</b> <b>Levels</b>			<b>Phillip-Perron (PP)</b> <b>Levels</b>		
<b>Variables</b>	<b>Constant</b>	<b>Constant and Trend</b>	<b>Variable</b>	<b>Constant</b>	<b>Constant and Trend</b>
Budget Deficit	-0.681	-2.177	Budget Deficit	-1.195	-3.472
Inflation Rate	-9.148	-8.484	Inflation Rate	-4.040	-3.949
Gross Domestic Product	-3.085	-4.116	Gross Domestic Product	-4.051	-4.085
Exchange Rate	-1.863	-1.471	Exchange Rate	-1.818	-1.827
Foreign Direct Investment	-1.876	-1.469	Foreign Direct Investment	-2.304	-1.690
Interest Rate	-1.573	-1.220	Interest Rate	2.287	-3.247
<b>Augmented Dickey Fuller (ADF)</b> <b>First Difference</b>			<b>Phillip-Perron (PP)</b> <b>First Difference</b>		
<b>Variables</b>	<b>Constant</b>	<b>Constant and Trend</b>	<b>Variable</b>	<b>Constant</b>	<b>Constant and Trend</b>
Budget Deficit	-5.081*	-4.960*	Budget Deficit	-7.325*	-7.282*
Inflation Rate	-4.700*	-4.426*	Inflation Rate	-8.722	-9.614*
Gross Domestic Product	-5.425*	-5.3475*	Gross Domestic Product	-8.496*	-8.638*
Exchange Rate	-3.910*	-4.050*	Exchange Rate	-4.375*	-4.382*
Foreign Direct Investment	-3.652*	-3.848*	Foreign Direct Investment	-4.238*	-4.608*
Interest Rate	-6.140*	-6.192*	Interest Rate	-8.573*	-8.634*

**Source: output E-views**

The null hypothesis ( $H_0$ ) for the ADF and PP tests is that all the series have a unit root. The results indicate that the all the variables but INF and GDP are not stationary at level when constant or trend is included in the ADF and PP tests. Since the series are not stationary at level, the variables were difference once before they became integrated of orders one I (1) when constant or constant and trend is included in the ADF and PP tests. The order of integration of a time series determines if it linear combination would be stationary that is, integrated of order zero (0). In this scenario, all the variables are non-stationary at I (1) this implies that we can only regress the variables only if they are co-integrated. Having known that all our variables were non-stationarity at level but became stationarity at first difference, it implies that they qualified for co-integration to determine the long-run relationship.

#### 4.2 Co-integration Analysis.

In our study we check for co-integration using Johansen test. This test is based on maximum likelihood estimation and two statistics: maximum Eigen values and a trace statistic. The Null hypothesis is that there is no Co-integration. A co-integration test is purposely done to check if the variables have a long run association with each other. The results of the co-integration analysis have been presented in the table 4.5.

**Table 4.4: VAR Lag Order Selection Criteria**

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-257.0965	NA	3.535576	21.12772	21.46900*	21.22237
1	-179.4596	105.5862*	0.420919*	18.83676*	21.56705	19.59403*

**Source: output E-views 7**

\* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion



HQ: Hannan-Quinn information criterion

the optimal lag length of the tests was determined using the Schwarz BIC model selection criterion as recommended by Stock (1994).

The results of the lag selection criteria presented in Table 4.5 reveal that all the five different information criteria namely: Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), Hannan-Quinn Information Criterion (HQ), Final Prediction Error (FPE) and Sequential modified LR test statistic (LR) considered suggest 1 as the optimal lag length.

**Table 4.5: Showing Co-Integration results of the variables under study  
Unrestricted Co-Integration Rank Test (Trace)**

<b>Hypothesized No. of CE(s)</b>	<b>Eigenvalue</b>	<b>Trace Statistic</b>	<b>0.05 Critical Value</b>	<b>Prob.**</b>
None *	0.972652	226.7054	125.6154	0.0000
At most 1 *	0.931233	140.3266	95.75366	0.0000
At most 2 *	0.701526	76.07774	69.81889	0.0145
At most 3	0.582968	47.05996	47.85613	0.0593
At most 4	0.392576	26.06974	29.79707	0.1266
At most 5	0.289775	14.10507	15.49471	0.0801
At most 6 *	0.217716	5.892894	3.841466	0.0152

**Source: output from E-views**

The findings of Table 4.4 above from the Unrestricted Co-integration trace rank test using one (1) as the maximum lag length of the model, shows that there are 4 Co-integrating equations (GBD, INF, GDP and IRR), therefore there is co-integration among Economic Growth Health Investment and Education Investment. Comparing the p-value at none and the p-value at most 2, it is decided that we reject the null hypothesis of no

co-integration at 0.05 level of significance. It is therefore concluded that there is a significantly long run relationship between the variables (INF, GBD).

**Table 4.6: Unrestricted Co-Integration Rank Test (Maximum Eigenvalue)**  
**Unrestricted Co-Integration Rank Test (Maximum Eigenvalue)**

<b>Hypothesized No. of CE(s)</b>	<b>Eigenvalue</b>	<b>Max-Eigen</b>	<b>0.05 Critical Value</b>	<b>Prob.**</b>
None *	0.972652	86.37880	46.23142	0.0000
At most 1 *	0.931233	64.24891	40.07757	0.0000
At most 2	0.701526	29.01777	33.87687	0.1704
At most 3	0.582968	20.99022	27.58434	0.2768
At most 4	0.392576	11.96467	21.13162	0.5512
At most 5	0.289775	8.212171	14.26460	0.3575
At most 6 *	0.217716	5.892894	3.841466	0.0152

**Source: output from E-views**

The results from Maximum Eigen value of 4.6. indicate that there is a Co-integration among 3 variables (GBD, INF and IRR). These findings confirm the results got from the first trace rank test hence by observing the p-values from the above table we reject the null hypothesis that there is a no Co-integration among these variables thus we conclude that there is a long run relationship between Budget Deficit and Inflation in Uganda (1991-2016). Therefore, we shall now employ ECM to evaluate short run properties of the co-integrated series.

### **4.3 Error Correction Model**

After confirming that the variables are co-integrated, an Error Correction Model which is constructed by including in the model, the lagged terms of the variables and the Error Correction Term was generated. The error correction model shows the short run relationship between variables and its results are presented in the Table 4.7.

**Table 4.7 Short run relationship model (Over-Parameterized Model)**

Dependent Variable: D(GBD)

Included observations: 24 after adjustments

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
C	0.006	0.032	0.210	0.837
D(BD(-1))	1.038	0.345	3.006	0.011
D(INF)	-0.032	0.013	-2.518	0.028
D(INF(-1))	-0.003	0.016	-0.231	0.821
D(GD)	-0.109	0.059	-1.845	0.092
D(GDP(-1))	0.016	0.059	0.275	0.788
D(FDI)	-0.027	0.009	-2.994	0.012
D(FDI(-1))	0.005	0.008	0.654	0.526
D(EXR)	0.019	0.007	2.447	0.032
D(EXR(-1))	-0.005	0.008	-0.685	0.507
D(IRR)	0.053	0.122	0.439	0.668
D(IRR(-1))	-0.254	0.096	-2.628	0.023
ECM(-2)	-1.490	0.370	-4.021	0.002
R-squared	0.799			
Adjusted R-squared	0.663			
Akaike info criterion	-1.836			
F-statistic	3.649			
Prob(F-statistic)	0.020			
Durbin-Watson stat	1.631			

**Source: output from E-views**

**Table 4.8 Parsimonious Model**

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
C	0.010	0.026	0.406	0.690
D(BD(-1))	0.049	0.262	3.992	0.001
D(INF)	-0.030	0.008	-3.547	0.002
D(GDP)	-0.111	0.048	-2.294	0.036
D(FDI)	-0.031	0.006	-4.604	0.000
D(EXR)	0.019	0.006	2.916	0.010
D(EXR(-1))	-0.004	0.002	-2.230	0.041
D(IRR(-1))	-0.239	0.065	-3.674	0.002
ECM(-2)	-0.252	0.084	-2.979	0.008
R-squared	0.780			
Adjusted R-squared	0.580			
Akaike info criterion	-2.080			
F-statistic	6.664			
Prob(F-statistic)	0.000			
Durbin-Watson stat	1.812			

**Source: output from E-views**

The second objective of this study was to establish the short run effect of inflation on budget deficit in Uganda. In findings, inflation had negative effect on the budget deficit of -0.030. while interest rate had negative effect of -0.239. The study established the R square of 0.780 and adj R square of 0.580 indicating a significant relationship. The F of 0.000 is below the 0.05, this means regression model was significant in giving true estimate of the variables and the means of the variables are significantly related.

## **CHAPTER FIVE**

### **DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.0. Discussions and Conclusions**

##### **5.1 Introduction**

The aim of this study was to investigate the long-run relationship between inflation and budget deficit in Uganda for a period of 1991 to 2016. Since this study involved time series data, there was need for stationarity tests to be carried out and since it involved a long run relationship analysis, Co-integration using Johansen test was also required. Finally, Error Correction Model was used to establish the impact of inflation on budget deficit.

##### **5.2 Discussion of Findings**

###### **5.2.1 Long-Run Relationship Between Inflation and Budget Deficit in Uganda (1991-2016)**

The purpose of the study was to assess the long-run relationship between inflation and budget deficit in Uganda (1991-2016). The researcher employed cointegration to achieve this objective whereby the findings showed the presence of long-term relationship between inflation and budget deficit. The major objective of this study was to test if there is a long run relationship between the variables in the model. Before testing for this long run relationship between the two variables, there was need to establish if the variables were non-stationary at level and if after first difference, they become stationary since this is mandatory for Co-integration to take place. From the previous analysis chapter, the findings revealed that all of our variables were found to be non-stationary at level but became stationary when differentiated once. However, after the Johansen trace test were run, we established that there is a long run

relationship between these two variables. Attempts to confirm the results of the trace tests using the Maximum Eigenvalue test also confirmed that there was a long run relationship between inflation and budget deficit in Uganda.

### **5.2.2 Short-Run Relationship Between Inflation and Budget Deficit in Uganda (1991-2016)**

From the results of the parsimonious error correction model to achieve the second objective, the ECM coefficient was correctly signed and statistically significant at 5% level of significance. This makes the result of the parsimonious model to be better than that of over-parameterized model. From the ECM equation above, the error correction term, which is otherwise referred to as the speed of adjustment is correctly signed which implies that about 25% of the short run inconsistencies are being corrected and incorporated into the long run equilibrium relationship. The adj  $R^2$  which measure the goodness of fit of the model is given as 0.580 which shows that about 58% of the total variation of inflation is being explained by the budget deficit.

The coefficient of the Gross Domestic Product shows a negative and statistically significant relationship with budget deficit at the short run. A unit increase in GDP was led to -0.111 decrease in budget deficit which conforms with the a priori expectation which implies that real gross domestic product if maintained over time can lead to decrease in fiscal deficit and hence economic growth. these findings are in conformity with, Sowa (1994) who by using error-correction model estimated the relationship between budget deficit and inflation for Ghana over the period 1963-90. This study found that budget deficit in Ghana is negatively influenced more by GDP volatility than by monetary factors, both in the long run and in the short run. For Turkey, Metin (1995) analysed the fiscal deficit process in Turkey covering the period of 1950-88, using a general framework of sectoral relationships found out that GDP can lower incidents of BD.

The coefficient of the total FDI in the study period shows a negative relationship with the budget deficit in the short run. A unit increase in FDI will lead to -0.031 decrease in budget deficit. The total Foreign Direct Investment in Uganda does bring a growth and hence reduces situations of unplanned fiscal deficits, because they are properly implemented and monitored. Corruption also is another challenge for this. These findings are in line with Metin (1998) who examined the relationship between the public sector deficit and inflation using a parsimonious, conditional, single-equation model for inflation, in which inflation depends on the budget deficit, the real growth rate of income, and base money. He found (using annual data for Turkey over the period 1950-1987) that FDI (as well as real income growth and debt monetization) negatively and significantly affect BD in Turkey

The coefficient of the Interest Rate lagged by one period shows a negative and negative relationship with BD in the short run. A unit increase in IRR (-1) was led to -0.239 decrease in BD which conforms with the priori expectation. This finding is in line with Maji et al, (2012) investigated on the impact of interest rate on fiscal deficits and inflation in Nigeria for the period between 1970 and 2009. The OLS approached was carried out on the data to test the type of the relationship of IRR on the two variables and the findings showed negative relationship. Therefore, recommended that the adequate monetary policy should be geared towards balancing the role interest rates play to both budget deficits and inflation.

The coefficient of the exchange rate lagged by one period shows a negative relationship with budget deficit in the short run. A unit increase in EXR (-1) was led to -0.004 decrease in BD which conforms with the priori expectation. This is in line with the findings of Darrat (2000) who utilized an Error Correction Model (ECM) to investigate if high budget deficits have any inflationary consequences in Greece over the period 1957-1993. Their empirical results found that the exchange rate variable exerts a negative and statistically significant impact upon BD in Greece. They conclude "besides

money growth, stable exchange rates have also played a significant and direct role in the Greek fiscal deficit process” (Darrat, 2000, p. 635).

### **5.3 Conclusion**

Budget Deficit is part of most of the developing countries’ annual financial budgets in the world including Uganda. This study sought to establish the effect of inflation has on budget deficit in Uganda. Findings showed that there exists a negative relationship between inflation and budget deficit in Uganda and these results are consistent with the Keynesian. Based on the dynamic growth model, the study concludes that inflation is negatively and significantly related on budget deficit as it discourages productivity in providing infrastructure, education, health and harmonize private and social interest. Since the negative effects resulted from data this implies that Uganda should invest heavily on development expenditures but also the researcher considered only the four quantitative variables (budget deficit, inflation rate, foreign exchange rate and interest rate).

Deficit financing is also necessary and positive instrument to enhance economic growth in developing countries like Uganda facing shortage of capital. However, it is necessary to emphasize that fiscal deficits should be undertaken with an efficient and well executed plan for economic growth and fighting inflation.

### **5.4 Recommendations**

#### **For Short-Run the Study Recommends...**

The study recommends that Uganda should broaden and manage efficiently the tax base in order to finance their expenditure adequately and help increase the multiplier that further generate output hence economic growth. The optimal levels of governments’ expenditure should be determined so as to avoid deficits and the crowding out effect of private investment which many economies encourage as the impetus to economic growth and development.



The government needs to reassert control over expenditures. This is particularly necessary in view of the constraints on alternative sources of financing deficits in Uganda. Being a highly indebted low-income country, external financing of additional expenditures cannot be guaranteed easily.

Uganda should create more revenue sources to increase the income to reduce dependence on developed countries and also to create conducive environment for more employment opportunities, expand infrastructures in water systems, road networks and power, for establishment of more private sectors which in turn will lead to economic development.

### **For Long-Run the Study Recommends ...**

The major policy implications of this study are that stable macroeconomics, trade liberalization and growth-oriented policies are workable if they are complimented by the provision of important public services like health, education, infrastructure of roads, ports, water resources, quick and impartial judicial system, effective policy making system, strong legal framework, judicious taxation and a professional government. Strong and stable policy planning, professional institutions and competitive public service thus considered prerequisite for growth. They may imply cost saving measures, for instance, reliance on flatter commodity taxes, make discriminatory pension, unemployment benefits based on work experience and wage level, disproportionately large spending on education, health and reduction of administrative cost. Expenditure composition can also promote economic growth. Fiscal adjustment that reduces unproductive expenditure and protects expenditure in social sector has proved to be more sustainable and more likely to result in fighting inflation and faster growth.

The magnitude of revenue loss due to smuggling and corruption at the borders is great. The Ugandan Customs and Excise requires continuous reforms to cope with the changing structure and strategy of smuggling. Adequate staff welfare must be given priority attention in order to boost staff morale and commitment, in addition to helping to curb corruption.

As part of efforts aimed at reducing the pressure on resources, favorable debt re-scheduling terms should be vigorously sought in order to free some resources for the domestic economy. At the present, the burden of external debt in terms of service obligations is very high.

Uganda, should also reduce the use of external borrowed funds to meet their budget deficit since they cause over shoot in local prices, and instead use internally borrowed funds so that both sides which benefit are in the same monetary circulation or from outside but where the borrowing conditions are favorable and conducive for them.

### **5.5 Limitations of the Study**

Secondary data used was from World Bank reports. Respective ministries have incomplete information therefore the data used in the study might not have been accurate for estimation due to the possibility of manipulation by the officials to meet their own country's interests or local interests but not international.

Also the data were not directly as per the requirements of the study so there were so many alterations and calculations to fit the requirements. There was no existence of the recently secondary data collected from budget deficits, that is why the researcher decided to use the difference between the revenue and the expenditure of the country and so necessitate the research to collect data from different sources to fill the gaps existed.

### **5.6 Suggestions for Further Research**

The study suggests for further research to be done on the impact of specific components of government expenditure like expenditure on military, education, health and social security and welfare and other variables on economic growth and development to ascertain Keynes' postulation that government expenditure positively

spur growth and development through the multiplier effect, thereby crowding-in private sector investment.

There are few people who have carried out this study and so few literatures exist on the study especially the local cases in all five countries. Also, the study should further be developed in detail to include more variables that affect the economic development so that to come up with reliable findings. Each Country especially the under developing ones should research on its economy to come up with solutions to the problems affecting the economic development.

### **5.7 Contributions of The Study**

This study contributes the severe need to entrench fiscal discipline in government operations at all levels that was ensure management of public finances, improve budgetary processes, including openness in the budget preparation, execution and reporting is been advocated. Also, to support growth in the real sectors of the economy by encouraging investors to have access to investible funds from banks; as suggested by Alavirad, A and Athawale, S. (2015) in their study the impact of the budget deficit on inflation in the Islamic Republic of Iran

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### APPENDIX 1: DATA OF THE STUDY

year	BD	INF	GDP	IRR	EXR	FDI
1991	0.28	28.1	5.55	2.798994	3.040943	0.03
1992	0.36	52.4	3.42	2.760114	3.085065	0.1
1993	0.47	1.2	8.33	2.826104	3.124488	1.7
1994	0.64	10	6.4	3.049099	3.173833	2.21
1995	0.71	6.6	11.52	2.859572	3.146559	2.11
1996	0.83	7.2	9.07	2.729644	3.194264	2
1997	0.85	8.2	5.1	2.879901	3.027628	2.79
1998	0.77	0.1	4.91	2.854062	2.946022	3.19
1999	0.9	5.8	8.05	2.279369	2.80828	2.34
2000	0.91	3.4	3.14	1.618449	2.829537	2.59
2001	1.04	1.9	5.18	2.029462	2.937736	2.59
2002	1	-0.3	8.73	1.691251	3.062717	2.99
2003	1.1	8.7	6.47	1.989902	2.773155	3.19
2004	1.31	3.7	6.81	-0.34159	2.733582	3.72
2005	1.4	8.4	6.33	1.625485	2.752081	4.21
2006	1.58	7.3	10.78	2.4981	2.746721	6.48
2007	1.6	6.1	8.41	0.954884	2.815936	6.45
2008	1.68	12.1	8.71	1.658803	2.898756	5.12
2009	1.94	13	6.8	1.786645	2.847051	4.63
2010	2.58	4	5.64	2.532869	2.762425	2.69
2011	1.9	18.7	9.39	2.507946	2.78866	4.43
2012	1.97	12.7	3.84	1.550235	2.928476	5.21
2013	2.32	4.9	3.59	2.292967	2.948661	4.46
2014	2.52	3.1	5.11	2.566455	2.963552	3.88
2015	1.81	5.4	5.19	2.639663	2.967105	2.72
2016	2.08	5.5	4.66	2.161322	2.978721	2.6