EFFECT OF CENTRAL BANK INDEPENDENCE ON INFLATION IN KENYA
(1966-2012)

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DECLARATION

This project is my original work and has not been presented for a degree in any other University or any other award.

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DEDICATION
To my husband Robert Gatheru and son Ndirangu Gatheru.
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<tr>
<td>ADF</td>
<td>Augmented Dickey Fuller Test</td>
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<tr>
<td>CBI</td>
<td>Central Bank Independence</td>
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<td>CBK</td>
<td>Central Bank of Kenya</td>
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<td>CPI</td>
<td>Consumer Price Index</td>
</tr>
<tr>
<td>EMS</td>
<td>European Monetary Systems</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>KEU</td>
<td>Kenya Economic Update</td>
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<td>KNBS</td>
<td>Kenya National Bureau of Statistics</td>
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<tr>
<td>KPSS</td>
<td>Kwiatkowski-Phillips-Schmidt-Shin</td>
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<tr>
<td>MPC</td>
<td>Monetary Policy Committee</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OMO</td>
<td>Open Market Operations</td>
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<td>TOR</td>
<td>Turnover Rate</td>
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OPERATIONAL DEFINITION OF TERMS

Central Bank Independence refers to the ability of central bank to carry out its day-to-day functions of promoting macroeconomic stability without interference from the government.

Turnover Rate refers to the actual, as opposed to the legally mandated, Governor Turnover rate.

Seignorage refers to the revenue earned from the issuance of money. It is the difference between the value of money and the cost of producing and distributing it.
ABSTRACT

Kenya suffered double digit inflation rates as from 1974 culminating in the highest ever recorded rate of 46 per cent in 1993. High inflation brings with it uncertainties that retard economic growth. As such, it is of paramount importance for a country to put in place mechanisms to maintain low and stable inflation rates. Among the solutions to high inflation rates is conferring independence upon the central bank. This study examined the effect of the independence of the Central Bank of Kenya on inflation in Kenya. It adopted a theoretical framework based on the time inconsistency theory developed by Barro and Gordon (1983). Empirical literature on the relationship between central bank independence and inflation is controversial with some studies showing a strong negative relationship while others find a weak relationship or none at all. This study adopted a correlational research design. Secondary time series data on annual inflation rates, budget deficit, imports, exports and the level of the Gross Domestic Product in Kenya from 1966 to 2012 was used. To contextualize the effect of CBI on inflation, a linear regression model was employed and the OLS estimation technique used to obtain parameter estimates. The results showed a strong negative relationship between CBI and inflation. Thus, increasing the independence of the Central Bank of Kenya leads to low rates of inflation. This is due to the fact that an independent central bank is better able to focus on its goals such as price stability and not defer to the changing needs of the government in place. It also means that monetary policy will dominate over the fiscal policy, which is necessary since fiscal policy changes with every new political government. Different governments have different priorities and as such stability of the Kenyan Shilling will be established through a dominant monetary policy backed by an independent Central Bank of Kenya (CBK).
CHAPTER ONE
BACKGROUND

1.1 Introduction
This chapter provides an introduction to the study by looking at the background to the study as well as the history of the Central Bank of Kenya. The chapter also presents the inflation trends in Kenya during the period of study.

1.1.1 Background to the study
Central Bank Independence (CBI) is defined as a situation where a central bank has the legal power to protect itself from external influence, the freedom to set the country’s monetary policy and carry out its mandate without any political interference (Ahsan, Skully and Wickramanayake, 2006). It also means that the central bank is free to select the appropriate instruments to control the price level, and inflation, while having limited accountability to parliament to keep its activities transparent (Ahsan et al. 2006).

The degree of independence of the central bank from other parts of government affects the rates of expansion of money and credit (Cukierman, Web and Neyapti, 1992). This in turn affects important macroeconomic variables such as inflation and the size of the budget deficit. To achieve macroeconomic stability, a low and stable inflation rate is required. An independent central bank with the means and tools to pursue the low inflation goal is better able to achieve this, rather than a government which through its spending can trigger high inflation (Dumiter, 2009). Dumiter (2009) also argues that an independent central bank will signal effective and credible inflation expectations by implementing an effective monetary policy.
As argued by Bodea and Hicks (2012), the key reason that CBI keeps inflation in check is that such delegation reduces the risk of time inconsistency in monetary policy. Time inconsistency arises because governments have incentives to enhance economic growth through surprise inflation and as such their own commitments about price stability have little credibility (Bodea and Hicks, 2012). Independent central bankers, it is argued, are more likely to take a policy view beyond the political cycle and to be more concerned about the risks to price stability than the politicians (Bodea and Hicks, 2012).

Cukierman (1996) studied 25 countries, comprising of industrial, developing and former socialist economies, which substantially upgraded the legal independence of their central banks between 1989 and 1996. The reasons for the upgrade varied from country to country and underlying these reasons was the quest for price stability. There are several reasons for choosing CBI as a means to ensure price stability according to Cukierman (1996). First, the breakdown of institutions created to safeguard stability such as the Bretton Woods system and the European Monetary System intensified the search for alternative institutions.

Second, the Bundesbank (German central bank), which was independent, showed a good track record, therefore proving that CBI could function as an effective device to assure price stability. Third, the Maastricht treaty by the European Economic Community stipulated that the member countries had to increase the independence of their central banks as a pre-condition for membership in the European Monetary Union.
Finally, policy makers find CBI as the most efficient institutional arrangement capable of reducing high and persistent inflation in future.

According to Alesina and Summers (1993), CBI may improve economic performance for several reasons. First, an independent central bank free from political pressure may behave more predictably, promoting economic stability as well as reducing the risk premiums in interest rates. By preventing pre-election manipulation of monetary policy, or reducing partisan shocks to policy following an election, the independent central bank will insulate the economy from political business cycles. Second, to the extent that high inflation has unfavorable effects on the economic performance either by creating distortions, encouraging rent-seeking or by raising risk premiums, it then follows that CBI would improve economic performance (Alesina and Summers, 1993).

1.1.2 Kenya's Macroeconomic Goals
The 8th National Development Plan (NDP 1997-2001) laid the foundation for the transformation of Kenya from an economy with agriculture as its backbone to a newly industrialized country (NIC) by 2020. It attempted to encourage savings, maximize investments and to create an enabling environment for the private sector to thrive. To this end, the primary goal of monetary policy was to maintain price stability by ensuring that the rate of expansion of money supply was consistent with the growth of economic activity and attainment of a sustainable balance of payment position. The target inflation rate during the plan period was set at single digit levels (Republic of Kenya, 1997). According to the plan, the target money supply growth level was to remain
below 11 per cent per year. Government borrowing, being the main source of money supply growth, was to be limited to 5 per cent of the gross recurrent revenue of the government as shown in the latest audited Appropriation Accounts (Republic of Kenya, 1997).

The government of Kenya, through various policy documents, has consistently laid emphasis on the importance of price stability for sustained economic growth and development. The mandate of ensuring low inflation is given to the Central Bank of Kenya (CBK). Strengthening the CBK was identified in the *Economic Recovery Strategy for Wealth and Employment Creation* (ERS 2003-2007) as a sure way of maintaining low inflation rates in the economy. The target inflation rate for the period was set at 5 per cent (Republic of Kenya, 2003). The focus of monetary policy for the period of the ERS was to ensure that growth in money supply of 10 per cent was consistent with economic growth, employment creation and a viable balance of payment position without putting undue pressure on inflation (Republic of Kenya, 2003). Emphasis was laid on the rate of growth of money supply as that has been shown to be the major cause of inflation in Kenya (Mwega, 1990).

The reforms undertaken to ensure realization of the goals of the ERS included increasing the independence of CBK by strengthening of the Monetary Policy Committee (MPC) to include people with expertise in financial and monetary policy disciplines from outside the public service. There was also increased transparency of the MPC as the minutes of the MPC meetings were required to be published. This was
expected to reduce information asymmetry as well as increase public confidence in the monetary authority. According to Crowe and Meade (2008), as central banks become more independent, there is increased demand for transparency both for reasons of accountability and legitimacy as well as to guide the expectations of financial market participants.

In addition, the coordination mechanism between fiscal and monetary policies was enhanced to ensure that the conduct of fiscal policy did not undermine the monetary policy objectives (Republic of Kenya, 2003). This was an important provision as Kinyua (2001) pointed out that CBK often had to accommodate expansionary fiscal policy even when there was need to implement contractionary policies. For CBI to be successful, the fiscal policy must not dominate over the monetary policy.

The ERS was successful in taking Kenya back on to the path of rapid growth, from a growth rate of 2.9 per cent in 2003 to 7.1 per cent in 2007 (Republic of Kenya, 2007). The inflation rate also improved from a post-election period high of 9.8 per cent in 2003 to 4.3 per cent in 2007.

The ERS was succeeded by the *Kenya Vision 2030*, which aims at building a globally competitive and prosperous Kenya by the year 2030. The fiscal policy framework underpinning the *Kenya Vision 2030* includes increasing government revenues to 22 per cent of the GDP, by the year 2015 and to be maintained until the year 2030. The fiscal deficit is to be maintained at less than 5 per cent of the GDP.
The monetary policy to be pursued during the period of the *Kenya Vision 2030* aims at maintaining a low inflation rate of below 5 per cent in line with the CBK target inflation rate. The CBK’s pursuit of a monetary policy stance consistent with this inflation rate and the envisaged growth of 10 per cent will lead to the realization of high and stable levels of growth and employment and poverty reduction (Republic of Kenya, 2007). In addition, a flexible exchange rate system will enhance Kenya’s competitiveness in line with an export-led and private sector-driven growth strategy.

It is evident from the policy documents that the Kenyan government has continued to lay emphasis on a low and stable inflation rate so as to realize the set development goals. This would suggest that an independent central bank may go a long way to realize the low and stable inflation rate. It would also suggest that the macroeconomic aspiration of a low and stable inflation rate will only be achieved if the independent CBK is policy-focused, results-oriented, transparent and accountable (Republic of Kenya, 2007).

### 1.1.3 Independence and the Central Bank of Kenya

The Central Bank of Kenya was established in 1966 under the Central Bank Act (Cap 491). The objective of the CBK was to assist in development and maintenance of a sound monetary, credit and banking system in Kenya (Republic of Kenya, 1984). The CBK was intended to provide an enabling environment for orderly and balanced economic development of the country and the external stability of the currency. The CBK was to also serve as banker and financier to the government (Republic of Kenya,
1984). Other provisions in the CBK Act (1984) included the terms by which the CBK would lend advances to the government. Such advances would attract an interest of no less than 3 per cent per annum, to be determined by the CBK with the consent of the Minister responsible for Finance. These direct advances were also not to exceed 25 per cent of the gross recurrent revenue of the government as shown in the Appropriation Account for the latest year audited by the Controller and Auditor General (Republic of Kenya, 1984).

Thus there was no direct provision in the CBK Acts, of 1966 and 1984, for the CBK to maintain price stability. The CBK Amendment Act (1984) had other objectives as mentioned above and this may have played a part in causing the high inflation rates. Inflation trends, tabulated by the Kenya National Bureau of Statistics (KNBS), show a continued rise in inflation rates in Kenya until the amendment of the Central Bank Act in 1996. The 1960’s had low inflation rates averaging at 2.7 per cent per annum. This is the period when there were no serious macroeconomic problems in the Kenyan economy to contend with. The decade between 1970 and 1979 was characterized by the breakdown of the Bretton Woods system of fixed exchange rates in 1971, the oil crisis of 1973-74 as well as the coffee and tea booms of 1976/77 (Kinyua 2001; Killick and Mwea, 1990). These shocks caused an erratic behavior in inflation: from 3.7 per cent in 1971 to 17.8 per cent in 1975 and then back down to 12.6 in 1978 (http://www.knbs.or.ke, 2013). The average for the decade was 10.33 per cent per annum.
The decade between 1980 and 1989 saw some reforms instituted such as the devaluation of the shilling, liberalization of imports and raising of the interest rate. The inflation rate remained at double digits. The average for the decade was 12.72 per cent per annum, showing a continued rise in the average rates of inflation. The 1990’s saw some of the highest recorded inflation rates in Kenya. This is explained by the high inflation rate of 46 per cent of 1992/1993, which was caused by printing of the local currency by the CBK to finance pre-election spending for the first multi-party elections in 1992. The year 1992 is the same year that the Goldenberg scandal came to light where Goldenberg International received billions of taxpayers’ money from the government as compensation for earning foreign exchange on fictitious gold and diamond exports (Warutere, 2005). This scandal arose out of a fraudulent effort to exploit schemes set up by the central bank to encourage exports and help alleviate the shortage of foreign exchange. This shortage occurred as external debt payments fell due and new loans and aid were cut back (Bandiera, et al., 2008). The election period also sees hoarded money released in the economy for campaign expenses and, as such, these periods tend to have high inflation rates. The average for the decade was 17.17 per cent per annum.

The lack of relevant and supportive fiscal policies as well as a lack of clear focus on inflation worked as an impediment to the CBK achieving its monetary policy goals in the 1970s (Kinyua, 2001). This led to erratic growth in macroeconomic variables such as inflation and economic growth. For example economic growth slowed down during
the period 1971-75 partly due to the collapse of the Bretton Woods system of fixed exchange rates in 1971, and the oil crisis in 1973 which increased pressure on domestic prices. During the period 1966 to 1975, inflation rose from 2.6 per cent in 1966 to 17.8 per cent in 1975 (Republic of Kenya, 2013).

In 1993, the government of Kenya, with the help of the International Monetary Fund (IMF), adopted a comprehensive reform programme under which fiscal, monetary and structural problems were tackled. The policy reforms included interest-rate liberalization, development of money and capital markets, improvement of the efficiency of financial intermediation, development of more flexible monetary-policy instruments, removal of credit ceilings, and reduction of both the government's excessive reliance on domestic bank borrowing and reduction of its budget deficit (Kinyua, 2001). Institutional reforms were aimed at setting up a regulatory framework, and ensuring a prudential regulation and supervision of the financial system (Isaksson, 2001). These reforms were preceded by high inflation and the near-collapse of the Kenya Shilling during the period 1990-1993, in the face of the first multi-party politics in 1992. Inflation had risen to 46 per cent in 1993 (Republic of Kenya, 2013).

In 1994, large capital inflows following liberalization of foreign exchange transactions and the coffee boom brought about the need for the government to mop up excess liquidity using Open Market Operations (OMOs) which decreased the money growth (Isaksson, 2001). This led to a drop of inflation rate to 28.8 per cent in 1994 (Republic of Kenya, 2013).
The Central Bank Act was amended in 1996 so as to give CBK authority to manage monetary policy. The principal objectives included formulating and implementing monetary policy aimed at achieving and maintaining price stability, as well as fostering liquidity, solvency and proper functioning of a stable market-based financial system (Republic of Kenya, 2009). Other objectives included formulation and implementation of foreign exchange rate policy, management of foreign exchange reserves as well as licensing and supervision of authorized money market dealers.

It is under this framework that the CBK sets the inflation targets and the instruments to ensure the realization of these targets. The control of inflation became the major focus of monetary policy to reign in the consequences of the relaxation of monetary policy in the period preceding the 1992 multi-party elections as well as the increase in oil prices due to the Gulf War (Rotich, et al. 2007).

The 1996 CBK Amendment Act granted CBK autonomy and reduced the authority of the Minister for Finance to override CBK's decisions. The Act also gave the CBK the independence to control money supply, which is the main source of inflation and price instability (Muriithi and Moyi, 2003). The Act further improved the security of tenure of the CBK Governor by setting the procedure required to remove the Governor from office (Republic of Kenya, 2009). The security of tenure is important so as to ensure price stability (Cukierman et al., 1992).
The Act goes on to stipulate that the CBK should submit a monetary policy statement to the Minister for Finance at intervals of not more than 6 months. The statement should specify the policies adopted by CBK, means by which the Bank intends to achieve the policy targets, reasons for choosing these policies as well as reviewing the progress of implementation of monetary policy in the period covered in the previous statement. The Minister then lays the statement before the appropriate National Assembly committee not later than the end of the subsequent session of Parliament after the statement is so submitted. Regular reports to the legislature or to the public, on the execution of the central bank policies enhance transparency and accountability of the central bank (Gutierrez, 2003). Accountability is an integral component of CBI (Jacome and Vazquez, 2005).

Following the promulgation of the Constitution of Kenya in 2010, CBK is now established under Article 231 of the Constitution. The CBK is charged with the responsibility of formulating monetary policy, promoting price stability, issuing currency and performing any other functions conferred on it by an Act of Parliament. The autonomy and independence of the CBK is entrenched in the Constitution by paragraph 2 of Article 231, which states that the CBK shall not be under the direction or control of any person or authority in the exercise of its powers or in the performance of its functions.
1.1.4 Inflation Trends in Kenya

The measurement of inflation in Kenya shifted from the arithmetic mean to a weighted geometric mean in October 2009 in line with international good practice. The latter methodology is less sensitive to volatile food prices and provides a more accurate assessment of price changes, adding more credibility to monetary policy (KEU, 2009).

Figure 1.1 is a graphical representation of the inflation trends in Kenya from 1964 to 2012.

![Figure 1.1: Inflation Trends in Kenya](image)


Figure 1.1 shows that the trend in inflation rates in Kenya, though decreasing, has not been stable. An expected and stable inflation rate is benign as agents build it into their
decision making. The inflation rates started rising in the early 1970’s due to both internal and external shocks namely sharp expansion in domestic credit, and the hike in fuel and coffee and tea prices (Kinyua, 2001). The 1980’s saw inflation rates of between 12 and 22 per cent which were caused by another hike in fuel price, burgeoning government expenditure, and the coffee boom of 1986. During this period, the CBK actions were under the tight control of the Minister responsible for Finance.

The 1990’s were characterized by the very sharp rise in the inflation rate such as the annual inflation rate of 46 per cent in 1993 following the first multi-party elections in 1992. The financial sector reforms were instituted beginning 1993 and by 1995, the inflation rate was down to 1.6 per cent. The CBK (Amendment) Act in 1996 established the autonomy of CBK giving the central bank the principal objective of achieving and maintaining stability in the general level of prices. Thus, the liberty of policymakers to make decisions on the tools and instruments to use in the stabilization of the inflation rate was enhanced. Inflation rates fell further in the decade with 1999 registering an average inflation rate of 5.8 per cent per annum.

The 2000’s saw inflation rates that were lower than previous decades with single digit inflation levels being recorded even in the election years of 2002 and 2007, when the inflation rates of 2.0 and 4.3 per cent per annum, respectively, were recorded. The entrenchment of the CBK in the Constitution in 2010 further improved its autonomy and in that same year average inflation rate of 4.1 per cent was recorded.
1.2 Statement of the Problem
The Kenyan government has over time put in place measures to ensure that the inflation rate is low and stable to enhance stable economic growth. These measures, such as inflation targeting and reduced government expenditure, have however not succeeded in achieving the intended goal.

To this end, the government has continued to promote the independence of the CBK. The amendment of the Central Bank of Kenya Act in 1996 gave the CBK the autonomy to formulate and implement monetary policy without interference from the government. The *Kenya Vision 2030* policy document seeks to reinforce the low inflation goal set by the CBK (Amendment) Act. It also reiterated the importance of transparent and accountable government institutions where the rule of law is adhered to. Entrenchment of the independence of CBK in the Constitution of Kenya 2010 sets the CBK well on the independence path.

The decrease in the inflation rate has however not been smooth so as to allow agents to build expectations of stable inflation rates into their decision making. The decade up to 1970 saw low inflation rates, ranging between 1.6 and 2.6 per cent, most probably due to the fact that there were no macroeconomic problems or shocks to contend with. The 1970s, 1980s and 1990s decades saw a rise in the inflation rates due to both external and internal factors. The autonomy and independence of the CBK was neither de facto nor de jure during these decades. Inflation rates, however, began to fall during the
financial sector reform period which included the amendment of the Central Bank Act in 1996.

The 2000's saw the single digit inflation rates, including in the 2002 and 2007 election years which recorded inflation rates of 2.0 and 4.3 per cent per annum, respectively. The double digit inflation rates experienced in the years 2004, 2008 and 2011 were explained by factors such as global food crises, increasing oil prices and post-election violence (KEU, 2012).

The studies on the relationship between CBI and inflation in which Kenya is covered include Cukierman et al. (1992), Eijffinger and de Haan (1996), and Sturm and de Haan (2001) where the studies covered several other industrial and developing countries. Cukierman et al. (1992) and Eijffinger and de Haan (1996) found a strong negative relationship between CBI and inflation while Sturm and de Haan found no significant relationship between the two variables.

This brought about a need to investigate the effect of CBI on inflation in Kenya, independent of other countries and taking into account country-specific factors which influence inflation such as the climatically and politically driven internal shocks as well as non-market driven interventions. The study also sought to find out the factors that most influence CBI in Kenya. The results of the study established that further action should to be taken to enhance independence of the CBK as CBI has significant influence on inflation in Kenya. Thus, the study helped fill the gap in knowledge on the
effect of CBI on inflation in Kenya, as few studies have investigated the Kenyan case as regards this relationship.

1.3 Research Questions
The research questions that guided this study were:

i. What are the factors affecting inflation in Kenya?

ii. What is the effect of CBI on inflation in Kenya?

1.4 Research Objectives
The main objective of this study was to establish the effect of CBI on inflation in Kenya and in effect, whether CBI can be used to achieve price stability herein. The specific objectives were to:

i. Determine the factors affecting inflation in Kenya.

ii. Determine the effect of CBI on inflation in Kenya.

1.5 Significance of the Study
The findings of this study are of significance to policy makers and academicians as it extended the existing knowledge base on the effect of CBI on inflation in Kenya. The concept of CBI in Kenya is relatively new and this study has helped raise awareness of its implications, especially now that the independence of CBK has been entrenched in the constitution. The results of the second objective of the study will help make appropriate suggestions to policymakers regarding the direction taken towards independence of the CBK.
1.6 Scope and Organization of the Study

The study focused on CBI and inflation trends in Kenya from the establishment of the CBK in 1966 to 2012. This study period covered the existence of the CBK during which the CBK was both under the control of the government as well as the period of increased independence.

The remainder of this research project is organized as follows. Chapter Two shows a review of both the theoretical and empirical literature on CBI and Inflation. Chapter Three focuses on the methodology used in the study, which includes the research design, theoretical framework, model specification, definition and measurement of variables, data sources and analysis. Chapter Four explains the empirical findings of the study while Chapter Five gives the summary, conclusion and policy implications of the study.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction
This chapter is divided into three sections. The first section is the theoretical literature, which reviews the existing theories behind CBI. The second section includes a review of some of the empirical studies that have been done to establish the effect of CBI on inflation. In addition, in this section, I assessed some literature on the determinants of CBI. The third section presents an overview of the reviewed literature.

2.2 Theoretical Literature
The theory underlying CBI is the time-inconsistency theory suggested by Kydland and Prescott (1977) and developed later by Barro and Gordon (1983). The researchers posited that delegating the power of formulation of monetary policy to governments, which generally have short term goals will result in excessive levels of inflation, thus inflationary bias. This bias stems from market failures or distortionary taxation that decreases output below its efficient level (Berger et al. 2001). The inflationary bias arises from the government incentives for monetary expansion classified by Kibmer and Wagner (1998) into the three motives of employment, balance of payment and revenue.

The time inconsistency theory is based on the model in which:

\[ y_t = y (\pi_t - \pi^e_t) + u_t \]  (2.1)
Where $y_t$ is the log of output measured as deviation from potential output, $\pi_t$ is the rate of inflation at period t, $\pi^t$ is the rate of inflation at period $t$ expected by the private sector at period $t - 1$, while $u_t$ is the supply shock and $\gamma$ is a positive constant.

The private sector is expected to have rational expectations. While the policy maker has preferences over inflation and output which are represented by the loss function:

$$L_t=0.5[(\pi_t-\pi^*)^2+\lambda(y_t-y^*)^2]$$ (2.2)

Where $\lambda > 0$ and $y^* > 0$. $y^*$ is the target output while $\pi^*$ is the target inflation rate.

Kibmer and Wagner (1998) argue that if policymakers operate in a discretionary regime, a socially desirable monetary policy may suffer from lack of credibility due to time-inconsistency. Time inconsistency theory makes the assumption that private agents are aware of the government’s incentives and expect that rate of inflation which the government no longer has incentive to deviate from (Kibmer and Wagner, 1998). The rational expected inflation rate will be higher than the socially optimal rate of inflation, if the social welfare function depends on any of the three motives mentioned previously for monetary expansion and the government cannot enter into any binding commitment to realize the socially optimal rate of inflation (Kibmer and Wagner, 1998).

Cukierman (1994) argues that one way of eliminating the inflation bias is by pre-committing policy to price stability or a low rate of inflation. To implement this commitment, the central bank should be given independence and be directed by law or
other means to focus on price stability, even if this means other objectives will be neglected (Kasseelah, et al., 2011; Cukierman, 1994).

Rogoff (1985) offered delegation of monetary policy to an independent central bank as a solution to the time-inconsistency problem. The central banker appointed should be conservative, and thus more inflation-conscious than average. Consequently, the central banker will place a greater weight than the society on stabilizing prices relative to stabilizing output, and so would be less tempted than the politicians to make surprise increases in money supply to boost incomes. This then will encourage the economic agents to reduce the inflation premiums that they build in the long-term contracts.

According to the theory, insulating the monetary policy from the political process avoids the problem of time inconsistency and helps enforce the low inflation equilibrium (Alesina and Summers, 1993). The credibility of monetary policy is enhanced by the CBI, as government pressures for a more expansionary stance can be more easily resisted. The eradication of this time-inconsistency of monetary policy should lead workers to lower their inflationary expectations, thus moderate their wage claims, and as a consequence of lower wage settlements, average inflation should reduce (Mangano, 1998).

Another argument for CBI is put forward by Sargent and Wallace (1981) as cited by Kasseelah et al., (2011), who argue that if monetary policy is dominant then fiscal authorities will be compelled to bring down the budget deficit or reduce the government
debt. If, however, the fiscal authority is dominant, then the monetary authority will not impact on the size of the government budget deficit and will be compelled to finance it by printing money. The assumption made here is that government bonds are no longer absorbed by the market. The more the CBI, the less is the pressure on monetary authorities to finance the government budget deficit.

### 2.3 Empirical Literature

Cukierman *et al.* (1992) used time series data of 72 industrial and developing countries, including Kenya, to study the effect of CBI on inflation during the period 1950 to 1980. They developed behaviorally oriented indices which included a questionnaire-based index for identifying deviations from the legal position of actual practice as well as the actual turnover rate of central bank governors and the political vulnerability of the governors. The authors employed a linear regression model and observed that for developed countries, legal independence was a statistically significant determinant of inflation with the predicted negative sign. As for the developing countries, the governor turnover ratio (TOR) was found to have a statistically significant positive influence on inflation as predicted. A major weakness of this study was the subjectivity in responses to the questionnaire which was used as an index of CBI. The staff of any central bank may want to portray the central bank as more independent than it really is.

Haan and Kooi (2000) developed an indicator for CBI based on the TOR of central bank governors for 82 developing countries to analyze the effect of CBI on inflation. They used time series data for the period 1980-89. The control variables employed were
political instability, the level of GDP per capita, the degree of openness, exchange rate and the debt-to-GDP ratio. They used a linear regression model and found a statistically significant relationship between inflation and CBI, proxied by TOR, when high inflation countries are included in the sample.

Sturm and de Haan (2001) studied 80 developing countries to establish the effect of CBI on inflation. The sample period examined was 1980 to 1998. The study used a bivariate linear regression model with inflation as a function of TOR and openness. A second multivariate linear regression model was used so as to take account of control variables such as political instability, GDP per capita, exchange rate regimes and the debt to GDP ratio. The results showed that the coefficient of TOR was statistically significant in the bivariate model but not significantly different from zero in the multivariate model. The exchange rate as a variable was found to be significant in both models.

A study by Lin (2009) investigated the effect of CBI on inflation using time series data of 44 countries over the period 1948 to 1994. Lin (2009) used a quantile regression technique to estimate the parameters of a linear regression model relating inflation rate to CBI and past inflation rate. The author found that the relationship between CBI and inflation was positive or negative depending on the level of inflation. For countries with low inflation, there was a statistically significant negative effect of CBI on inflation, while the converse was true for those countries with high inflation rates.
Carlstrom and Fuerst (2009) undertook a study of 26 industrial countries over the period 1955-2000 to investigate the relationship between CBI and inflation. They used the indices developed by Alesina and Summers (1993) and Fry et al. (2000). Their results showed that there is a negative relationship between inflation and CBI. They concluded that there is stability in the inflation-independence relationship as the slope of the linear relationship reported in the Alesina and Summers (1993) study was statistically identical to the fitted slope in the Fry et al. (2000) data. They put forward the assertion that increased CBI explains 63 per cent of the decline in average inflation rates.

Kasseeah et al. (2011), using time series data for 20 African countries over the period 1988-2007 investigated whether CBI could help achieve price stability in African countries. The authors used two measures as proxy for CBI, Governor TOR and the budget deficit in a linear regression model. The control variables used were the exchange rate, GDP per capita, trade openness and the unemployment rate. Although both proxies were positively related to inflation as expected, the results also indicated that CBI was not a sufficient condition to resolve the problem of inflation. Other additional measures such as the commitment to a balanced budget by the government were recommended. The relevance of this study is the introduction of the budget deficit as a proxy for CBI especially in African countries where it is easier for the government to finance its expenditure through seignorage rather than tax revenues (Kasseeah et al., 2011)
Forder (1996), Campillo and Miron (1997) and Mangano (1998), however offer contrasting views as to the relationship between CBI and inflation. Forder (1996), in a critique of the indices used to measure legal independence, disapproved of the reading of central bank statutes as a measure of legal independence due to its subjectivity. Forder (1996) proposed the use of the degree of public support for independence as a better measure but did not give suggestions on how to measure this particular index.

Campillo and Miron (1997) used time series data of 62 industrial and developing countries in the period 1948-94, to analyze the effect of CBI on inflation. He used the Ordinary Least Squares (OLS) technique to estimate parameters in a linear regression model. The variables used were CBI, political instability, degree of openness, income per capita, national debt to GDP ratio and the exchange rate regime. They found that in the high income OECD countries, there was a negative relationship between inflation and CBI although the coefficient was nowhere near significant. However, in the low-to-moderate income countries and in the entire sample, the CBI variable was positively related to inflation, contrary to other studies.

Cargill (2012) in a study focusing on Japan, Korea and the USA points out the weaknesses in the indices measuring CBI in several studies. He posits that the potential for misclassification due to overreliance on de jure independence by previous studies by Cukierman et al. (1992) is high given that de facto independence is overlooked. The de jure measurement should be termed as ordinal ranking rather than cardinal measures.
suitable for econometric modeling. Cargill adds that the correlations between measures of CBI such as the reading of central bank statutes are not stable.

All the studies reviewed used a transformed inflation rate. This is a better measure of inflation as it will reduce heteroscedasticity of the error term. The control variables employed include the level of trade openness in a country, the national debt to GDP ratio, political instability, per capita income, unemployment rate and the exchange rate regime.

2.4 Overview of Literature
The time-inconsistency theory of monetary policy, on which this study was anchored, explained the problem of inflationary bias which arises if a policy decision which is part of an optimal plan is no longer optimal at the time of implementation. As such, monetary policy should be delegated to conservative policy makers at the central bank whose aversion for inflation will ensure that the price level remains stable. A conservative central banker is better able to resist the demands of the government if those demands will give rise to inflation, if the central bank is independent. In addition to a conservative central banker, the problem of time-inconsistency is solved by price stability being the principle objective of a central bank as well as the legal indicator of the central banker's preferences.

From the empirical studies reviewed, CBI was proxied by legal independence, Governor TOR as well as the budget deficit. Legal independence as a measure of CBI was, however, criticized for its subjective nature. Presnak (2005) cautioned against the
use of legal independence in Sub-Saharan countries since the government may act contrary to the central bank statutes and manipulate monetary policy. A high TOR of the Governors of central bank means that a governor may not hold the position long enough to stabilize the low inflation goals set. If, on the other hand, the governor stays on for several years and even outlasts several heads of government thus presiding over price stability, then his reputation can warrant him resisting considerable pressure from the government (Cukierman et al. 1992). A change of Governors above the threshold of 0.25 changes a year is indicative of a dependent central bank and thus increasing inflation rates.

The budget deficit is a good measure of CBI in African countries where it is easier for the government to finance its expenditures through seignorage since the tax revenues fall short of the planned expenditure (Kasseeah et al. 2011). This is due to inefficiency in revenue collection systems in these countries which give rise to less than optimal collections. The lag of the budget deficit will be used because the effects of seignorage are not immediately felt on the inflation rate.

A majority of the studies reviewed used time series techniques to estimate the parameters of linear regression models. The effect of CBI on inflation, however, was found to be controversial as some studies found a negative relationship while others resulted in a weak relationship or none at all.
An examination of previous studies on the effect of CBI on inflation revealed that most of the studies, except a few (Panagiotidis and Triampella, 2005; Dumiter, 2009 and Ito, 2010), were cross-country studies. Since the Legal CBI index is derived from the central bank legislation it remains constant in the sample period, for each country. As such the effects attributed to CBI may include the effects of other country-specific factors that have not been explicitly included in the model. Also, international comparisons need to be interpreted cautiously because of differences in definitions and methodology in the data across countries.

This brought about the need to study the effect of CBI on inflation in Kenya so as to take into consideration other factors that may affect inflation such as the exchange rate regime and government budget deficit. This study adopted the time-inconsistency theory as it best explained the problem of inflationary bias during policy making.

The solutions provided by researchers included delegation of monetary policy making to an independent central bank whose principal objective is ensuring stability of prices in the economy. This was in addition to the appointment of an inflation-averse governor of the central bank (Rogoff, 1985; Cukierman, 1994). This study sought to fill the above-mentioned gaps as well as to add to the literature on CBI and inflation in developing countries.
CHAPTER THREE
METHODOLOGY

3.1 Introduction
This chapter presents the methodology used to study the effect of CBI on inflation in Kenya. The research design, theoretical framework and the specification of the empirical model of the study are also shown. The definition and measurement of variables are outlined as is the estimation technique, diagnostic tests and data type and source.

3.2 Research Design
The study sought to analyze the effect of CBI on inflation in Kenya. The study adopted a correlational research design where data was collected and observed to explore the relationship between variables. Secondary data for the period 1966 to 2012 was used.

3.3 Theoretical Framework
The study adopted a theoretical framework based on the time inconsistency theory developed by Barro and Gordon (1983). It states that delegating the formulation and implementation of monetary policy to the central bank will break away from the problem of inflationary bias which is present when the government manages monetary policy. This is because a government will generally have short term goals whose outcome is excessive inflation levels. The time inconsistency theory best explained the problem of inflationary bias of monetary policy and is based on the model,

\[ y_t = \gamma (\pi_t - \pi^e_t) + u_t \quad (3.1) \]
Where $y_t$ is the log of output measured as deviation from potential output, $\pi_t$ is the rate of inflation at period $t$, $\pi_t^e$ is the rate of inflation at period $t$ expected at period $t - 1$, while $u_t$ is the supply shock and $y$ is a positive constant.

The agents have rational expectations such that:

$$\pi_t^e = E_{t-1}\pi_e$$  \hspace{1cm} (3.2)

Where $E_{t-1}$ is the mathematical expectations operator based upon information available at period $t - 1$. Inflation expectations are assumed to be formed before inflation is realized. The policy maker has preferences over inflation and output which are represented by the loss function:

$$L_t = 0.5[(\pi_t - \pi^*) + \lambda(y_t - y^*)^2]$$  \hspace{1cm} (3.3)

Where $\lambda > 0$ and $y^* > 0$.

Where $y^*$ is the target output while $\pi^*$ is the target inflation rate and $\pi_t$ and $y_t$ are the inflation rate and output at period $t$. The policy maker is assumed to control the rate of inflation. The socially optimal rate of inflation is assumed to be zero for simplicity. The policy maker is also assumed to minimize the sum of current and discounted future losses by choosing the appropriate target inflation rate.

The discretionary solution can be found by minimizing $L_t$ with respect to $\pi_t$, subject to equations 3.1 and 3.2. The resulting first order condition is:

$$(\pi_t - \pi^*)^2 + \gamma \lambda (y_t - y^*) = 0$$  \hspace{1cm} (3.4)
This gives the solutions to inflation as;

$$\pi_t = \pi_t^* + \lambda \gamma y^* - \frac{\lambda y}{1 + \lambda y^2} ut$$  \hspace{1cm} (3.5)$$

To show that the discretionary equilibrium given by equation 3.5 is sub-optimal, the optimal policy rule under commitment is estimated. This is done by minimizing $Lt$ in equation 3.3 with respect to both $\pi_t$ and $\pi_t^*$. The resulting first order conditions are:

$$\begin{align*}
(\pi_t - \pi_t^*) + \gamma \lambda (y_t - y^*) + \theta_{t,t} &= 0 \\
E_{t,t}[-\gamma \lambda (y_t - y^*) - \theta_{t,t}] &= 0
\end{align*}$$

Where $\theta_{t,t}$ is the Lagrange multiplier corresponding to 3.2

These give the solution to inflation as;

$$\pi_t = \pi_t^* - \frac{\lambda y}{1 + \lambda y^2} ut$$  \hspace{1cm} (3.8)$$

Thus, a central bank working under a rule to maintain price stability is best able to maintain low inflation levels as demonstrated by the comparison between a discretionary regime shown by equation 3.5 and a policy-rule based regime shown by equation 3.8. The average inflation in a discretionary regime is more than that in a policy rule by $\lambda \gamma y^*$ as shown in equation 3.5.

3.4 Model Specification

The empirical model which helped achieve the objectives of this study was derived from Kasseeah et al., (2011). The authors estimated the model:
\[ \text{Infl}_t = \beta_0 + \beta_1 \text{TOR}_t + \beta_2 \text{BUD}_t + \beta_3 \text{LnGDP}_t + \beta_4 \text{OPEN}_t + \beta_5 \text{UNEMP}_t + \text{Dummy} + U_t \]  (3.10)

Where;

\text{Infl}, is the transformed rate of inflation calculated as 1 divided by the sum of 1 and the inflation rate

\text{TOR}, is the turnover rate of central bank governors

\text{BUD} is the first lag of the budget deficit

\text{LnGDP} is log of the real GDP

\text{OPEN} is the degree of trade openness

\text{UNEMP} is the unemployment rate

\text{Dummy} are two dummy variables representing the Fixed and Flexible exchange rate policy regimes

\( \beta \)'s are parameters

\( U \), is the error term
### 3.4 Definition and Measurement of Variables

#### Table 3.1: Definition and Measurement of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation ((Infl_t))</td>
<td>The persistent increase in the general price levels</td>
<td>Measured using the real annual depreciation of a given amount of money, ( Infl = \frac{1}{1 + \pi_t} ).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The transformed inflation rate took the values between 0 and 1.</td>
</tr>
<tr>
<td>Governor Turnover Rate ((TOR_t))</td>
<td>The rate at which the central bank governors are replaced.</td>
<td>Measured as the ratio of the number of Governor changes to the number of years. There was expected to be a positive relationship between TOR and inflation.</td>
</tr>
<tr>
<td>Budget deficit ((BUD_t))</td>
<td>A budget deficit occurs when government expenditures exceed revenue collected.</td>
<td>The observations of the budget deficit as a percentage of the GDP. The study will use a one-year lag. The variable BUD was expected to have a positive relationship with inflation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------------------------</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Log of Real Gross Domestic Product (LnGDP&lt;sub&gt;t&lt;/sub&gt;)</strong></td>
<td>The value of economic output adjusted for price changes such as inflation.</td>
<td>Measured by the log of the observations of real GDP. The relationship between GDP and inflation was expected to be negative given the slow growth coupled with high inflation rates.</td>
</tr>
<tr>
<td><strong>Trade Openness (OPEN&lt;sub&gt;t&lt;/sub&gt;)</strong></td>
<td>The volume of trade between Kenya and the rest of the world.</td>
<td>Measured by the sum of imports and exports as a percentage of GDP. It was expected to positively related to inflation.</td>
</tr>
<tr>
<td><strong>Unemployment Rate (UNEMP)</strong></td>
<td>The rate of Unemployment</td>
<td>Measured by Formal Sector employment as a ratio of Total Employment. Unemployment was expected to have an inverse relationship with inflation.</td>
</tr>
<tr>
<td><strong>Dummy</strong></td>
<td>2 dummy variables representing the exchange rate policy regimes since 1966.</td>
<td>Observations of exchange rate regime in place: Fixed Exchange rate regime and flexible exchange rate regime.</td>
</tr>
</tbody>
</table>
3.5 Data Type and Source
This study made use of secondary annual time series data for the period 1966 to 2012 for analysis. The data consisted of annual inflation rates, budget deficit, imports, exports and the level of GDP. The data was sourced from the Kenya National Bureau of Statistics, the Central Bank of Kenya, the United Nations Conference on Trade and Development. Where data source did not give complete information, other sources such as International Financial Statistics were consulted and necessary corrections affixed to maintain consistency.

3.6 Data Analysis
This study used time series data. To avoid spurious regression results, the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity test was carried out. The KPSS stationarity test is superior to the Augmented Dickey Fuller (ADF) test since it takes into account the structural breaks in time series data.

The series was tested for presence of unit roots using Kwiatkowski-Phillips-Shin test. The results indicate that the variables Inflation, Budget Deficit, Openness and Flexible Exchange Rate were stationary at level. At level, the variables GDP, Unemployment and Fixed Exchange Rate were non-stationary at the five per cent level of significance. But these became stationary at first difference. The variable TOR was also non-stationary and only became stationary at the second differencing (See Appendix 1).

Correlation tests were carried out on the variables in equation 3.10 to show the linear relationships between the variables in the study. This is shown in table 3.2.
Table 3.2 Correlation Matrix

<table>
<thead>
<tr>
<th>Inflation</th>
<th>Turnover Rate</th>
<th>Budget Deficit</th>
<th>GDP</th>
<th>Openness</th>
<th>UNEMP. Ex.</th>
<th>Fixed Ex.</th>
<th>Flex. Ex.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover Rate</td>
<td>0.5690</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget Deficit</td>
<td>0.5687</td>
<td>-0.2320</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>-0.0848</td>
<td>-0.4896</td>
<td>0.4293</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>0.3783</td>
<td>0.4351</td>
<td>0.0740</td>
<td>0.1389</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment</td>
<td>-0.1929</td>
<td>0.1383</td>
<td>-0.361</td>
<td>-0.832</td>
<td>-0.3202</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Fixed Ex.</td>
<td>0.1458</td>
<td>0.4281</td>
<td>-0.233</td>
<td>-0.835</td>
<td>0.0212</td>
<td>0.6961</td>
<td>1.0000</td>
</tr>
<tr>
<td>Flexible Ex.</td>
<td>-0.2672</td>
<td>-0.1868</td>
<td>-0.117</td>
<td>-0.069</td>
<td>-0.1847</td>
<td>0.1830</td>
<td>-0.373</td>
</tr>
</tbody>
</table>

Source: Own Computation

The Turnover Rate, Budget Deficit, Openness and the Fixed Exchange Rate regime dummy variables exhibited a positive correlation with the dependent variable. The two proxies for CBI, Turnover Rate and Budget Deficit showed a weak negative relationship. As such, both proxies were employed to obtain a better measure of CBI.

A correlation index below 0.5 indicates that there may not be a serious problem of multicollinearity in the variables. Some of the off-diagonal elements in the correlation matrix above show a correlation index of greater than 0.5 which is indicative of relatively high degree of multicollinearity.
The presence of relatively high degree of multicollinearity, however, does not affect the effectiveness of extrapolating the fitted model to new data provided that the predictor variables follow the same pattern multicollinearity.

To address the first objective, Equation 3.10 was estimated using the Ordinary Least Squares (OLS) estimation technique. The various factors that affect inflation were included as control variables to determine their effect on inflation.

The second objective of the study was to determine the effect of CBI on inflation in Kenya. The proxies for CBI, represented by the variables Turnover Rate and Budget Deficit, were analyzed and the variable with greater influence over inflation shown in Chapter Four.
CHAPTER FOUR
EMPIRICAL FINDINGS

4.1 Introduction
This chapter presents the empirical findings of the study which answer the objectives stated. It consists of the summary of descriptive statistics as well as the results of the regression analysis.

4.2 Summary of Descriptive Statistics
Table 4.1 presents the summary of statistics for the variables which include the mean, minimum and maximum values as well as the skewness and kurtosis.

Table 4.1: Summary of Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation</td>
<td>0.1226</td>
<td>0.0897</td>
<td>0.0213</td>
<td>0.3846</td>
<td>1.6223</td>
<td>4.7935</td>
</tr>
<tr>
<td>Turnover Rate</td>
<td>0.2317</td>
<td>0.1904</td>
<td>0.125</td>
<td>1.0000</td>
<td>3.1827</td>
<td>12.4887</td>
</tr>
<tr>
<td>Budget Deficit</td>
<td>3.9171</td>
<td>0.5559</td>
<td>2.4754</td>
<td>5.4394</td>
<td>0.2789</td>
<td>3.9484</td>
</tr>
<tr>
<td>GDP</td>
<td>11.822</td>
<td>1.9518</td>
<td>9.0148</td>
<td>15.1086</td>
<td>0.1838</td>
<td>1.6371</td>
</tr>
<tr>
<td>Openness</td>
<td>-0.4924</td>
<td>0.8368</td>
<td>-3.4703</td>
<td>0.8577</td>
<td>-0.4850</td>
<td>4.9919</td>
</tr>
<tr>
<td>Unemployment</td>
<td>3.3638</td>
<td>0.4074</td>
<td>2.6196</td>
<td>3.8367</td>
<td>-0.3698</td>
<td>-1.7839</td>
</tr>
<tr>
<td>Fixed Exchange</td>
<td>0.4043</td>
<td>0.4961</td>
<td>0</td>
<td>1</td>
<td>0.3902</td>
<td>1.1523</td>
</tr>
<tr>
<td>Flexible Exchange</td>
<td>0.1702</td>
<td>0.3799</td>
<td>0</td>
<td>1</td>
<td>1.7550</td>
<td>4.0801</td>
</tr>
</tbody>
</table>

Source: Own Computation
The degree of asymmetry of the distribution is measured by skewness where skewness level greater than or less than zero shows that the data is not normally distributed. Skewness is positive except for the variables Openness and Unemployment. A positive skewness measure means that the tail on the right side of the probability density function is longer than the tail on left side. The shape of the distributions of Openness and Unemployment Rate are, however, negatively skewed towards the left. The abnormal distribution of the data in this study can be explained by factors such as the scope of time in this study.

Kurtosis measures relative peakedness or flatness of a distribution relative to a normal distribution. According to Table 4.1, the distributions of the variables Budget Deficit, GDP, Unemployment Rate and Fixed Exchange Rate regime are relatively flat since they have a kurtosis of less than 3. The distributions of the variable TOR is mostly peaked meaning the distribution is sharper than a normal distribution with values concentrated around the mean. This can be explained by the higher turnover of the governors of the central bank between the years 1983 and 2006, than in the other years.

4.3 Empirical Results
This section presents the empirical results of the study. The presentation and discussion of the results is undertaken as per the study objectives.

4.3.1 Factors Affecting Inflation in Kenya
The first objective of the study was to determine the factors that affect inflation in Kenya. To achieve this, equation 3.10 was estimated using OLS technique. The
estimated results are presented in Table 4.2. The regression results summarized in table 4.2 show that the F-statistic which is the coefficient of the joint determination was 49.60. It had a probability of 0.0000, implying statistical significance at 1 per cent. This means that the variables included in the model jointly explain the changes in inflation. The estimation results also give an Adjusted $R^2$ of 88.09. This means that 88.09 per cent of the changes in inflation are explained by the variables in the model.

Table 4.2 Regression Results

| Dependent Variable: Inflation | Coefficient | Standard Error | t-Statistic | P>|t|
|------------------------------|-------------|----------------|-------------|------|
| Turnover Rate                | 0.2278      | 0.0406         | 5.6049      | 0.0000|
| Budget Deficit              | 0.1315      | 0.0096         | 13.6679     | 0.0000|
| Gross Domestic Product      | -0.0432     | 0.0095         | -4.5558     | 0.0001|
| Openness                    | 0.0136      | 0.0076         | 1.7841      | 0.0822|
| Unemployment                | -0.0445     | 0.0254         | -1.7516     | 0.0877|
| Fixed Exchange Regime       | -0.1156     | 0.0335         | -3.4523     | 0.0014|
| Flexible Exchange Regime    | -0.0766     | 0.0234         | -3.2800     | 0.0022|
| C                           | 5.2816      | 0.1708         | 1.6481      | 0.1074|

R Squared 0.8990  
Adjusted R-Squared 0.8809  
F Statistic 49.601  
Prob> F 0.0000

*Source: Own Computation*
Table 4.2 shows that the coefficients of the variables Turnover Rate, Budget Deficit, Gross Domestic Product, Fixed Exchange Rate and Flexible Exchange Rate regime were statistically significant at the 5 per cent significance level.

The coefficients of the variables Openness and Unemployment were statistically significant at the 10 percent significance level.

The variables Turnover Rate and Budget Deficit which were proxies for CBI in the study presented with the expected positive sign. Consequently, as the turnover rate of the holders of the office of CBK governor rise, then the rate of inflation will also rise. The rate of inflation will also rise with an increase in the Budget Deficit. The coefficients of the proxies were 0.2278 and 0.1315 for the Turnover Rate and Budget Deficit, respectively. The coefficients were both statistically significant at the 5 per cent level of significance. A single change in the Governor Turnover will lead to a 0.2278 change in the rate of inflation, whereas a unit change in the Budget Deficit will lead to a 0.1315 change in the rate of inflation in the same direction.

The GDP variable had a negative sign. This may be explained by the slow growth as a result of multiple shocks coupled with rising above-target inflation rates in the first medium term period 2008-2012 (Republic of Kenya, 2013). The coefficient of the GDP variable was 0.432. This means that a one per cent change in the level of GDP led to a 0.432 unit change in inflation in the opposite direction during the period. The coefficient of GDP was statistically significant in explaining the variation in inflation at
the 5 per cent level. Thus, the variable GDP was shown as an important factor in explaining the trends in inflation.

The variable Openness was important in explaining the trends in inflation. The coefficient was less than unity at 0.136 and presented with the expected positive sign. The coefficient was statistically significant at the 10 per cent level of significance. Trade openness is therefore important in explaining inflation whereby a unit change in trade openness will lead to a 0.136 per cent change in inflation.

The Unemployment variable had the expected negative sign implying that an increase in unemployment will lead to a decrease in inflation. The magnitude of the coefficient was 0.0445, which was statistically significant at the 10 per cent level of significance. This implied that a unit change in unemployment levels led to a change in inflation of 0.0445 per cent in the opposite direction.

The control dummy variable used was the floating exchange rate regime dummy. The dummy variables presented with negative signs and were statistically significant at the 5 per cent level of significance. The coefficient of the Fixed Exchange Rate regime dummy was -0.1156 while that of the Flexible Exchange rate regime dummy was -0.0766. This is indicative of the fact that movement from the Fixed Exchange Rate regime to the Floating Exchange Rate regime caused the inflation rate to drop. It also shows movement from the floating exchange rate regime to the flexible exchange rate regime led to a further falling of the inflation rate.
4.3.2 Effect of CBI on Inflation in Kenya

The second objective of the study was to determine the effect of CBI on inflation in Kenya. The regression results presented in Table 4.2 shows that there is an inverse relationship between inflation and CBI. The proxies representing CBI were important in their influence over inflation. As such, CBI does indeed affect inflation in Kenya and can be a long term solution to the problem of high rates of inflation. The Turnover Rate has a higher coefficient of the two proxies for CBI meaning that it has a greater weight on inflation targeting than Budget Deficit. As such, the time inconsistency problem has a greater influence on inflation in Kenya than seignorage.

The estimated coefficient for the Turnover Rate of CBK governors which was used as a proxy for CBI had the expected positive sign. The coefficient of the variable TOR (0.228) was statistically significant at the 5 per cent level of significance. The absolute value of the coefficient is less than unity implying that a 1 per cent increase in TOR will lead to a 0.228 increase in inflation. The results conform to those of Kasseeah et. al (2011) where the authors found a positive relationship between the variable TOR and inflation with a coefficient of 0.260. Thus, the TOR is an important factor in explaining the level of inflation in Kenya. A higher governor turnover rate will imply low levels of CBI and, therefore, a higher the rate of inflation.

The estimated coefficient of the lagged Budget Deficit variable, which was used as a proxy for CBI, had the expected positive sign. The results indicated that a one per cent increase in the Budget Deficit led to an increase in the inflation rate of 0.132 per cent.
The coefficient of the variable was also statistically significant, at the five per cent level of significance. This finding is also in line with Kasseah et al. (2011) assertion that an increase in the level of government’s budget deficit adds pressures on the central bank to manipulate monetary policy and thus deviate from the price stability goal.
CHAPTER FIVE
SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction
This chapter presents a summary of the study, conclusions and explains the implications drawn from the findings of the study. It will also highlight the limitations of the study and suggest areas for further research.

5.2 Summary
The purpose of this study was to investigate the effect of CBI on inflation in Kenya, independent of other countries, taking into account country-specific factors which influence inflation.

The study adopted a regresional research design where secondary data was collected and analysed to explain the relationship between variables. The study was based on the time-inconsistency theory developed by Barro and Gordon (1983). The theory holds that delegating the formulation and implementation of monetary policy to the central bank will break away from the problem of inflationary bias, which is present when the government manages monetary policy.

To contextualize the effect of CBI on inflation in Kenya, a linear model was employed in which the inflation rate was the dependent variable, while the explanatory variables comprised of lagged budget deficit, turnover of central bank governors, unemployment,
GDP, trade openness and a dummy of the exchange rate regime in operation. The data used was between the years 1966 to 2012.

The results indicated that there is an inverse relationship between CBI and inflation in Kenya. This means that enhancement of the independence of the CBK contributes to reducing inflation rates and thus, achieving the goal of price stability.

5.3 Conclusion

This study has conformed to a number of studies that have shown that there is an inverse relationship between CBI and inflation. Thus, the more independent a central bank is then the more likelihood of low inflation outcomes. Since CBI is an important factor in influencing inflation in Kenya, it should be considered as a solution to the problem of high inflation rates.

The CBI proxies in the study both had a positive relationship with inflation. This means that an increase in the turnover rate of governors and a burgeoning budget deficit, both of which imply lack high levels of independence, lead to an increase in the rate of inflation. Of the two CBI proxies, turnover rate had a higher coefficient (0.228) than budget deficit (0.134) and as such the former had a greater influence on inflation than the latter. This implies that the problem of time-inconsistency of monetary policy has a greater threat to price stability than seignorage.
5.4 Policy Implications

The findings of this study lead to various policy implications that can be drawn. The positive and statistically significant coefficients of the CBI proxies point to a need for the alignment of the laws on central bank to measures that will lead to low inflation outcomes.

Stricter lending limits should be applied so as to curb a growing budget deficit. Measures taken should include lending limits in absolute terms rather than as a percentage of the budget. The CBK should also be allowed to be the final authority on matters of monetary policy. This will ensure that CBK is able to focus on its main objective of price stability as stipulated in the Constitution, rather than deferring to the government of the day. According to Kibmer and Wagner (1998), price stability should be the principle objective of a central bank as well as the legal indicator of the central banker’s preferences, and a pointer to the political independence of the bank.

The governor turnover rate variable showed a larger coefficient than the budget deficit variable. This leads to a conclusion that time inconsistency of monetary policy poses a bigger problem to price stability than seignorage. This speaks to a lack of credibility of central banks vis-à-vis private agents since central banks are unable to stick to their long term goals of price stability, which in turn fuel the inflationary expectations of economic agents (Kasseeh et. al 2011). According to Rogoff (1985), a conservative central bank governor is a solution to this problem and can help restore the credibility of central bank as well as limit the level of seignorage. In addition, having an independent
board appoint the central bank governor will remove any influence politicians may have on the CBK.

5.5 Areas for Further Research

The Monetary Policy Committee was formed in April, 2008 and is responsible for the formulation of monetary policy. The government, through the ERS (2003-2007) policy document, sought to strengthen the MPC and increase transparency, both measures aimed at enhancing the autonomy of the CBK. This study has, however, established that the problem of time inconsistency of monetary policy has a greater influence on inflation than seignorage in Kenya. For further research, a study needs to be undertaken to investigate the effectiveness of MPC in the management of inflation.
APPENDICE 1: Unit Root Test

KPSS Unit Root Test for Inflation

Null Hypothesis: INFL is stationary
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>0.207631</td>
<td>0.207631</td>
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</table>

Asymptotic critical values*:
1% level: 0.739000
5% level: 0.463000
10% level: 0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction): 0.007875
HAC corrected variance (Bartlett kernel): 0.016256

KPSS Unit Root for Turnover Rate

Null Hypothesis: TOR is stationary
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.480461</td>
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Asymptotic critical values*:
1% level: 0.739000
5% level: 0.463000
10% level: 0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction): 0.035506
### TOR

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>HAC corrected variance (Bartlett kernel)</td>
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Null Hypothesis: \( D(TOR) \) is stationary  
Exogenous: Constant  
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

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<th>LM-Stat.</th>
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</table>

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction) | 0.003290 | |
HAC corrected variance (Bartlett kernel) | 0.007593 | |

Null Hypothesis: \( D(TOR,2) \) is stationary  
Exogenous: Constant  
Bandwidth: 19 (Newey-West automatic) using Bartlett kernel

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*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction) | 0.003617 | |
HAC corrected variance (Bartlett kernel) | 0.000398 | |

### KPSS Unit Root Test for Budget Deficit

Null Hypothesis: BUD is stationary
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

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<tr>
<td>10%</td>
<td>0.347000</td>
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</tbody>
</table>

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction) | 0.302410
HAC corrected variance (Bartlett kernel) | 0.436628

**KPSS Unit Root Test for GDP**

Null Hypothesis: GDP is stationary
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

<table>
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Asymptotic critical values*:

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<tbody>
<tr>
<td>1%</td>
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<td>5%</td>
<td>0.463000</td>
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<tr>
<td>10%</td>
<td>0.347000</td>
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</tbody>
</table>

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction) | 3.818477
HAC corrected variance (Bartlett kernel) | 18.98168

Null Hypothesis: D(GDP) is stationary
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

LM-Stat. | 50
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<tr>
<td>10% level</td>
<td>0.347000</td>
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</tbody>
</table>

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

| Residual variance (no correction)              | 0.421966|
| HAC corrected variance (Bartlett kernel)       | 0.213945|

**KPSS Unit Root Test for Openness**

Null Hypothesis: OPEN is stationary
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

<table>
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</tr>
<tr>
<td>10% level</td>
<td>0.347000</td>
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</tbody>
</table>

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

| Residual variance (no correction)              | 0.685398|
| HAC corrected variance (Bartlett kernel)       | 1.852779|

**KPSS Unit Root Test for Unemployment**

Null Hypothesis: UNEMP is stationary
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
<tr>
<th>Kwiatkowski-Phillips-Schmidt-Shin test statistic</th>
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<td>1% level</td>
<td>0.739000</td>
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<td>5% level</td>
<td>0.463000</td>
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</tbody>
</table>

51
Null Hypothesis: D(UNEMP) is stationary
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

<table>
<thead>
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<th>LM-Stat.</th>
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<tbody>
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<td>Kwiatkowski-Phillips-Schmidt-Shin test statistic</td>
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<tr>
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<tr>
<td>5% level</td>
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<td>10% level</td>
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</table>

KPSS Unit Root Test for Fixed Exchange Rate

Null Hypothesis: FXD is stationary
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

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<th>LM-Stat.</th>
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</thead>
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<tr>
<td>Kwiatkowski-Phillips-Schmidt-Shin test statistic</td>
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<td>Asymptotic critical values*:</td>
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<tr>
<td>1% level</td>
</tr>
<tr>
<td>5% level</td>
</tr>
<tr>
<td>10% level</td>
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</table>

Residual variance (no correction) 0.020533
HAC corrected variance (Bartlett kernel) 0.009923

Residual variance (no correction) 0.240833
HAC corrected variance (Bartlett kernel) 0.009923
### KPSS Unit Root Test for Flexible Exchange Regime

Null Hypothesis: FLE is stationary  
Exogenous: Constant  
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

<table>
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<tr>
<th>LM-Stat.</th>
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<tbody>
<tr>
<td>Kwiatkowski-Phillips-Schmidt-Shin test statistic</td>
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</table>
| Asymptotic critical values*: | 1% level   0.739000  
|                           | 5% level   0.463000  
|                           | 10% level  0.347000  |
| *Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1) |             |
| Residual variance (no correction)   | 0.141240    |
| HAC corrected variance (Bartlett kernel) | 0.592024    |
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*Institute for Security Studies, Paper 117*