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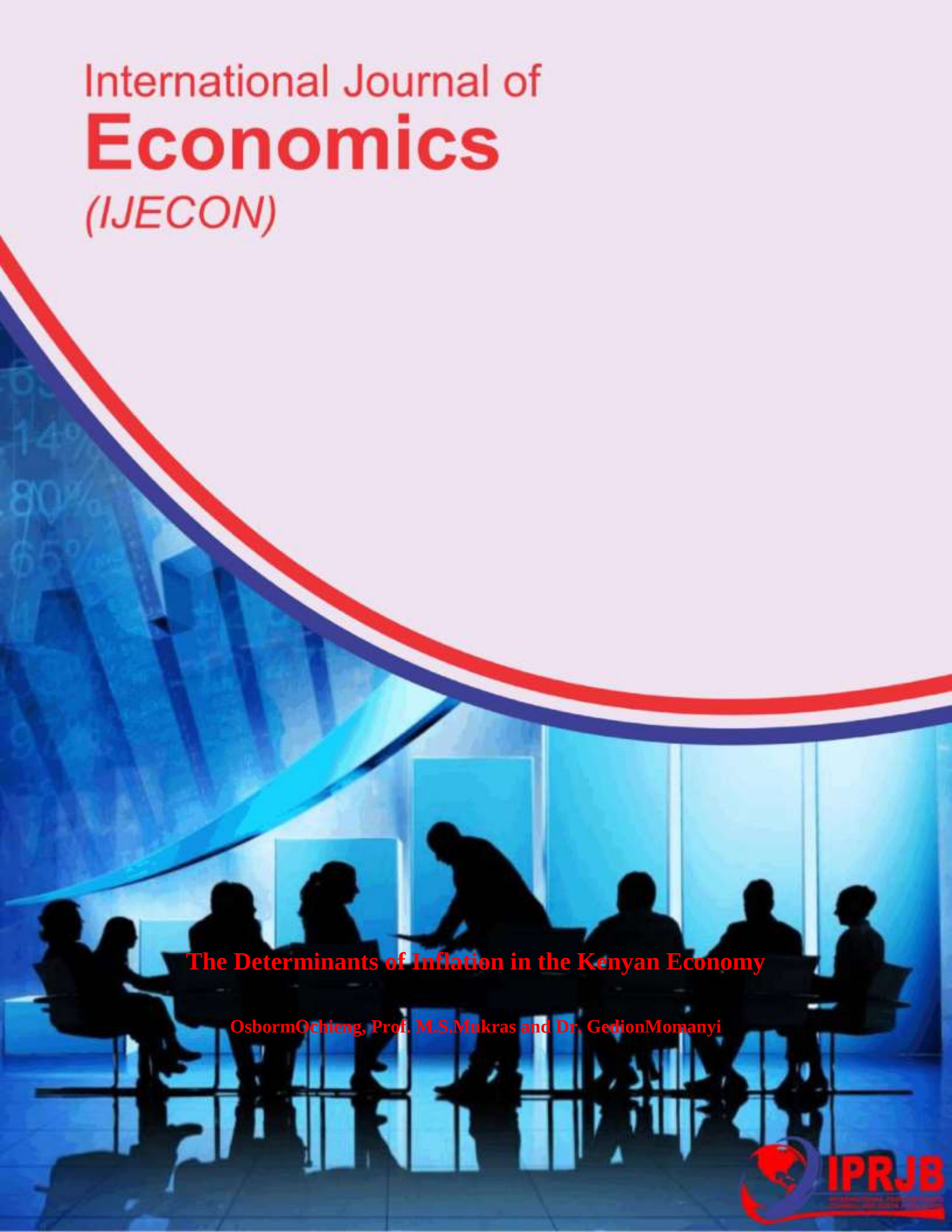

# The Determinants of Inflation in the Kenyan Economy

OsbormOchieng, Prof. M.S.Mukras and Dr. GedionMomanyi

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# The Determinants of Inflation in the Kenyan Economy

**[1*]Osborn Ochieng**
**[1*]Post graduate student, Maseno University**
**[*]Corresponding Author's Email: jimodhis@yahoo.com**

**[2]Prof. M.S.Mukras, Department of Economics**
**Maseno University**

**[3] Dr. GedionMomanyi,Department**
**Maseno University**

**Abstract**

***Purpose:*** In many Sub-Saharan countries it is challenging for monetary authorities to control inflation even if there is a political will, due to weak institutional frameworks, thin financial markets and imperfect competition among banks.The purpose of this study therefore was to investigate the determinants of inflation in the Kenyan economy.

**Methodology**:An explanatory research design was adopted.The study was carried out in Kenya,an East African country. The study used data from secondary sources only.The study employed an empirical test of the relation between inflation and the determining factors

**Results:**These results imply that Price fluctuations and Lag inflation rates greatly affect inflation rate positively while real GDP growth affects inflation rate negatively.The findings also showed that Money supply growth, Foreign Exchange rate and interest rate do not have a significant relationship with inflation. In addition the findings revealed that the inflation model exhibits a linear structure as the coefficients of squared terms of the predictor variables were found to be statistically insignificant. Based on the findings above the study concluded that real GDP growth, price fluctuations (changes in oil prices) and the previous period's inflation rate (lag inflation rate) are the ideal factors that affect inflation in Kenya.

**Recommendations:*Unique contribution to theory, practice and policy*** .Several recommendations and policy implications emanate from the study. Firstly, Real GDP growth is the main instrument policy makers should aim at in controlling the inflation rate. According to the results, real GDP growth is a significant determinant of inflation rate during the study period. An increase in real GDP leads to a decrease in inflation rate.

***Key words****: monetary determinants, non-monetary, non-linearity in the inflation model*

## 1.0 INTRODUCTION

Inflation refers to the increase in the general level of price of a basket of goods and services that is representative of an economy over a period of time. Inflation is measured by the percentage change in a price index, which is the average price level for a set of goods and services, relative to a base year (Romer, 2009).

The Consumer Price Index (CPI) is the most commonly used index for measuring inflation. The rise in the price level reduces the purchasing power of the currency in an economic unit. Inflation occasions income and wealth redistribution effects depending on who benefits from the price increases (Romer, 2009). Additionally, at the macroeconomic level, inflation fosters uncertainty in the economy, affects long-time planning and commitments and diverts resources from production as firms and consumers spend more time and resources trying to avoid inflation (Totonchi, 2011).Studies on inflation in developing economies have been growing. For instance, studies by Brouwer and Ericsson (1995), Thomas (1999), Delgado and Robinson (1994),Damian (2010**),**Sovuthea (2013), are decade apart and still reveal the need to uncover determinants of inflation.

Studies by Akbari and Rankaduwa (2006), Kemal (2006), Qayyum (2006) and Khan et al. (2007) were conducted in emerging economies such as Brazil, Pakistan, and Ukraine. The studies revealed different signs for macroeconomic indicators and this is an indicator that conflicting results on monetary and non-monetary determinants of inflation in emerging economies exist. A probable reason for the lack of consensus is because their models for predicting inflation assumed a linear approach and do not comprehensively address the dynamic relationship between various macro-economic determinants of inflation. This study is the first one of its kind to address this gaps.

In a study on economic growth and inflation rate in Kenya, Kigume (2011) shows that low economic growth rate and inflation rates have been experienced over the years in Kenya. However this study failed to identify the short-run and long-run impact of inflation on economic growth and no causation is established between the economic growth and inflation rate. The relationship between inflation and economic growth has brought a lot of controversy both in theory and empirical literature and they concluded that there existed a negative relationship between inflation and economic growth rate and further that the variations in the observed levels of inflation in the country is accounted by the global oil prices changes and the shocks caused by changes in agricultural commodity prices in the global market(Kigume, 2011).

### 1.2 Statement of the Problem

Inflation targets in Kenya have been missed frequently, and the level of inflation has been higher compared with the level of inflation in developed and emerging economies. Missed inflation targets present a dynamic inconsistency challenge to policy makers. The implication of dynamic inconsistencies is that macroeconomic policies formulated on the basis of inconsistent inflation forecasts may have a negative impact on economic growth. Many reasons have been advanced for dynamic inconsistencies among them deficient models. These deficiencies include the lag selection, inappropriate transmission mechanism, inefficiency of financial systems are and policy

poor choice of tools. Empirical studies have examined the determinants of inflation in Pakistan, other studies looks at the threshold effects in the relationship between inflation and growth in Rwanda and as a result the findings from the study are likely to be divergent from those that are experienced in Kenya. Studies in Kenya looks at the determinants of inflation in Kenya using the Phillips curve approach and fail to consider both the short-run as well as the long-run determinants of inflation which is the main foundation, with which this study sought to address. Similarly studies on inflation in Kenya have looked at the relationship between inflation and GDP growth, interest rates and the impact of monetary policy tools on inflation and in their estimations consider a linear relationship between the variables in the models. There is no a priori reason to assume that the inflation model has to be linear without test for non-linear effects and as a result this study will also look at the possible existence of a non-linear structure in Kenya's inflation model. Since modeling the inflation rate as an integrated process appears to improve our understanding of inflationary dynamics, this study extends the existing determinants of inflation along three dimensions. First, it seeks to perform a long-run analysis of the determinants of inflation, secondly it seeks to establish the short-run determinants of inflation rates and lastly, the study will investigate the existence of a non-linear structure in the inflation model for Kenya.

### 1.3 Objectives of the Study

i. To establish the monetary determinants of inflation in Kenya
ii. To investigate the non-monetary determinants of inflation in Kenya
iii. To test for possible non-linearity in the inflation model in Kenya

## 2.0 LITERATURE REVIEW

There are two fundamental tenets on which the theories of inflation are built, these are; the aggregate demand (demand pull) and cost-push theories. The demand-pull theory states that inflation results from a rise in aggregate (demandHellwig, 2002). As such, the theory regards price changes as a market clearing mechanism and inflation is seen as a result of excess demand in commodity and factor markets. Consequently, factors that influence demand-pull inflation include increases in money supply, government spending and the price level in the rest of the world. Conversely, under the cost-push theory, inflation is seen as the result of factor prices accelerating more rapidly than factor productivities. Essentially, cost-push inflation occurs as a result of decreases in aggregate supply (Hellwig, 2002). This may be due to an appreciation in wages or the price of raw materials. Such increases lead to higher production costs, hence the term 'cost-push' inflation. Higher production costs may bring about a reduction in the employment rate and a drop in output (Hellwig, 2002;Hendry, 2001).

Through the avenues of demand pull and cost push theories, followers of the Keynesian and Monetarist schools of thought have formulated different approaches to understand the inflationary process. According to the Keynesians Keynes (1936), inflation is a result of income disturbances and shocks to the economy, like oil price increases, while the Monetarists believe that inflation occurs because of excess demand and inappropriate monetary responses to economic situations (Freidman, 1968).

The Keynesian Model may be represented as

□□ $f$□$l,w,u,o,p^e$□,…….. (1)

where□,l, w, u, o, $p^e$ represent inflation rate, excess demand for labour, wage rate, unemployment rate, output and price expectations, respectively.
The Monetarist Model may be structured as

□□ $f$□$y,m_s,i$□, ……. (2)

where y represents changes in real income, $m_s$ money supply and *i* refers to the cost of holding cash (interest rate). Classical theorists have also constructed models in an effort to better understand the causes of sustained price increases in an economy. Their approach is quite similar to that of the monetarists where inflation is a product of 'too much money chasing too few goods'. In this state, the increased money supply leads to a jump in the demand for goods and services, thereby causing inflation (Laidler, 2005; Qayyum, 2006).

In an effort to combat criticisms from the Monetarists, the Keynesians put forward a modified theory of inflation, based upon imperfect competition. In this theory, the Keynesian theorists state that to an individual worker in wage negotiations, the price level is exogenous Hendry (2001),Qayyum (2006) and Svensson (2000). However, to all the workers in the negotiation, the price level is endogenous. As a result, inflation occurs because workers want higher wages and firms want higher profits. Therefore, if workers are granted a wage increase, firms will increase prices (by a mark-up) and this leads to inflation. That is, inflation is influenced by wage increases and firms' mark-up prices (Friedman, 1968).

Similar to the Keynesians, the Monetarists found an angle to combat criticism from the Keynesians by proposing a theory in which firms are unsure of the reason for a price increase. That is, they may be unsure if there are inflationary pressures at work or if consumer demand has actually risen. After finding out the reason for the price jump, firms will adjust their prices accordingly, based on rational expectations. Therefore, price expectations influence the inflation rate(Friedman, 1968)

In addition to the theories described above, there is the supply side theory, which is also related to Monetarism and proposes that the supply of goods and services (instead of money supply) may contribute to the inflationary process. That is, if there is 'too much money chasing too few goods' then two solutions are possible; either decrease the money supply or increase the supply of goods and services (Durevall&Sjö, 2012). The variables for the determination of inflation in this model include the output gap (representing the deviation of actual output from desired output) and excess money (which is the difference between actual and desired money)(Cheruiyot, 2012; Durevall&Sjö, 2012).

Another approach to understanding the inflationary process is formulated under the Structuralist model of imported inflation Frisch (1977). This model shows that a country's dependence on external markets may bring about inflation, since heavy reliance on external variables is expected to motivate upward pressure on domestic prices. Another model from the structuralist school of thought, the Scandinavian model Frisch (1977), which seems mostly relevant to small open economies hypothesizes that inflation is influenced by world prices, wages and productivity. Frisch (1977) also mentions an augmented Scandinavian model developed by Branson and Myhrman,

(1976), in which unemployment rate and expected inflation in the tradable sector are added to the determinants of inflation in the Scandinavian model. Further development cites structural factors such as weather conditions, policies aimed at protecting certain industries or just trading policies may also influence the rate of inflation. If there's a hurricane, which damages food supply and infrastructure, then prices of goods and services will definitely shoot up (Bernanke, 2005).Also, in protecting certain industries, cheaper goods and services may not be allowed into the country, which results in higher prices for certain goods and services. This shows that inflation may be a consequence of weather conditions and trade protection policies(Cheruiyot, 2012).

**2.1 Empirical Review**

Kemal (2006) conducted a study in Pakistan to establish whether inflation is a monetary phenomenon. The study applied Cointegration technique on quarterly data from 1975:1 to 2003:4. Results provide support for the quantity theory of money and also suggest that the money supply works in the short run period in less than a year. However the study incorporated only two dependent variables that are Growth in Money Supply ($M_2$) and Growth in Real GDP and thus may not be exhaustive enough to sufficiently explain the determinants of inflation. The current study uses more variables This study however did not consider both long run and short run effect thus presenting a conceptual gap. In addition it used Ordinary Least Square Method (OLS) thus an assumption of linearity. The current study sought to address these gaps.

Similarly, Qayyum (2006) in a study of inflation in Pakistan also found a strong correlation between money growth and inflation. Excess money supply growth has been the central contributor to the rise in inflation in Pakistan in the corresponding period. Given that the focus of this study was Pakistan economy, it presents a contextual or geographical gap that this study sought to fill. The study also failed to account for dynamic effects as well as non-linearity issues. Barasa (2009) conducted a study on the casual relationship between inflation and exchange rates in Kenya for the period 1998 to 2008. The study used the Granger-Causality test to determine whether there is a causal relationship between inflation and the exchange rates in Kenya. The study found out that there is a causal relationship between inflation and exchange rates in Kenya for only the US Dollar and the Great Britain Pound only for the short-run. However, all the currencies depicted a causal relationship with the inflation rates in the long run except the Ugandan shilling. Out of the results one can only use the inflation differentials to predict future exchange rates for the Great Britain Pound and the US Dollar. The study used only two variables; inflation rate and exchange rates thus presenting a conceptual gap. The current study fills this gap by including more variables in the model. Additionally the study failed to analyze the monetary and non-monetary determinants of inflation an area that the current study sought to address.

Tumkou and Caroline (2012) conducted a study on the long run relationship between interest rates and inflation in Kenya. The study investigated the relationship between expected inflation and nominal interest rates in Kenya and the extent to which the Fisher effect hypothesis holds. Using secondary data for the period 1999-2011. The study used regression analysis. The findings and analysis were in support of the existence of partial fisher effect in Kenya because both interest rates and inflation rate do not move with one on-one over the period under study. However the study used interest rate as the only independent variable and thus may not adequately explain the

determinants of inflation. The current study examines more variables and thus bridging this gap as well as improving the statistical reliability of the estimators.Kigume (2011) conducted a study on the relationship between inflation and economic growth in Kenya for the period 1963-2003. The study used the Philips curve approach using secondary time series data. The study employed unit root and granger causality tests and the tests indicated that inflation was stationary of order 1 whereas GDP was stationary of order 0. Granger causality tests revealed that there was no causality between inflation and economic growth rate. The analysis in the study was also done using Ordinary Least Squares (OLS) technique. The study found that there was a negative short run relationship between inflation and economic growth. Further, this relationship was positive in the long run. These results showed that inflation was affected by its own first and second lags, economic growth, climatic shocks (for example drought), monetary policy interventions and external shocks like the oil price. On the other hand, economic growth was affected by its first and second lags only. In this case, the Phillips curve approach was not applicable since it presents a short run positive relationship between inflation and economic growth while the results presented an inverse short run relationship and a direct long run relationship between inflation and economic growth in Kenya.

**2.2 Conceptual frame work**

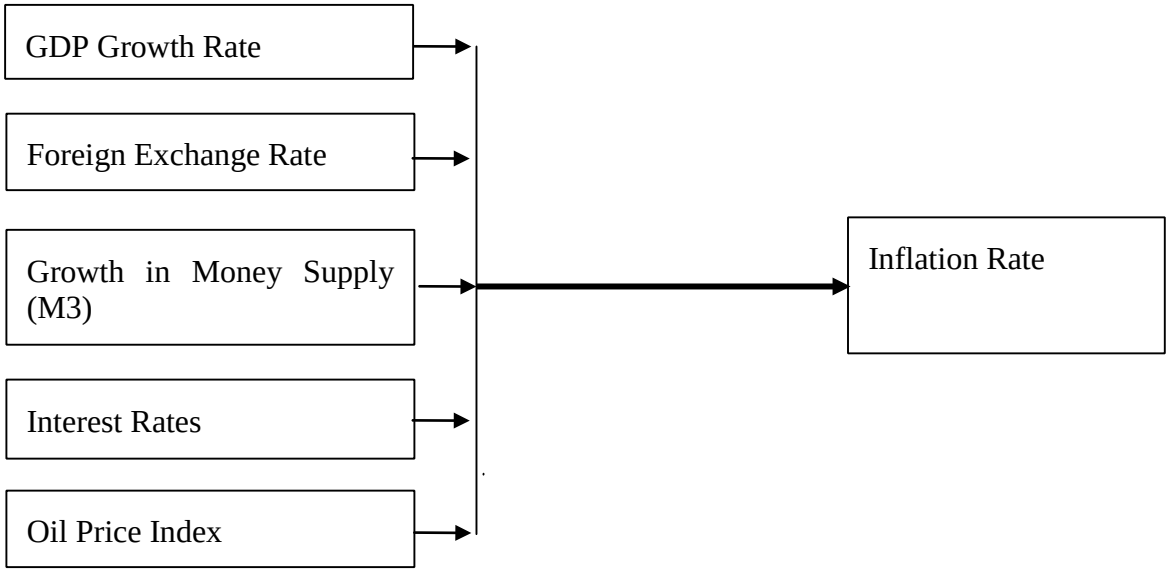


**Figure 1: Conceptual framework**

## 3.0 RESEARCH METHODOLOGY

An explanatory research design was adopted.The study was carried out in Kenya, an East African country bordering the Indian Ocean, between Somalia and Tanzania.The study used data from secondary sources only.First it only included two variables crude oil price and exchange rates. To examine the determinants of inflation in Kenya, the study employed an empirical test of the relation

between inflation and the determining factors.Based on the theoretical discussions in the previous chapter the long run equation is specified as follows:

$\boldsymbol{\pi_t = \alpha_0 + \beta_0 Ms_t + \beta_1 i_t + \beta_2 rGDP_t + \beta_3 l\pi_t + \beta_4 rEX_t + \beta_5 Y_t + \mu_t}$**…….. (3)** The short-run model to be estimated therefore will be of the following form;

$\boldsymbol{\pi_t = \alpha_0 + \beta_0 \Delta Ms_t + \beta_1 \Delta i_t + \beta_2 \Delta rGDP_t + \beta_3 \Delta l\pi_t + \beta_4 \Delta rEX_t + \beta_5 \Delta Y_t + u_{t-1} + \mu_t}$**…(4)**

Where,$\boldsymbol{\pi}$ = inflation;

**Ms** = Money Supply;
**i** = Interest rate;

**rGDP** = Real Income;

**lπ** = Lagged Inflation;

**rEX** = Real Exchange rate,

**Y** = Oil Price .

α and βare the parameters to be estimated associated with the regression model.

μ = Error term Where: $\mu_t \sim IID(0, \sigma_\mu^2)$ $u_{t-1}$the lagged error term from the long-run model which represents the error correction term.

### 3.1The expected signs of the coefficients

**Table 1Expected Results and Literature source**

| Variable | Description | Expected sign and Literature source |
|---|---|---|
| Real Income (Real Gross Domestic Product) | Kenya Shillings | +ve Positive- AfDB (2011) |
| Interest rate | Percentages | -ve Negative- Durevall and Sjö (2012). |
| Money Supply/Monetary Base | Kenya Shillings | + ve Positive- Durevall and Sjö (2012) and Ndung'u (1994) |
| Real Exchange Rate | Percentages | +ve Positive-Kiptui (2009) and Ndung'u (1994) |
| Oil price | Kenya Shillings | + ve Positive- Durevall and Sjö (2012). |

## 4.0 RESULTS AND DISCUSSION

### 4.1 Descriptive Statistics

#### 4.1.1 Summary of descriptive statistics

From table 2 it is evident that most of the macroeconomic variables have not been stable over the period but rather fluctuating.

**Table 2: Summary of Descriptive Statistics**

| | Inflation | CBR | REER | Oil prices | M3Growth | GDP Growth |
|---|---|---|---|---|---|---|
| **Mean** | 8.520775 | 10.33642 | 84.13906 | 62.06830 | 13.82814 | 4.300737 |
| **Median** | 7.056471 | 9.810000 | 78.66000 | 59.22000 | 14.44339 | 4.883819 |
| **Maximum** | 19.19126 | 18.47000 | 107.0800 | 123.0300 | 28.34999 | 8.375225 |
| **Minimum** | 1.219512 | 4.180000 | 64.91000 | 19.48000 | 0.115910 | -2.460530 |
| **Std. Dev.** | 5.250176 | 3.904636 | 13.70645 | 33.27166 | 6.791644 | 2.628617 |
| **Skewness** | 0.580609 | 0.445150 | 0.246200 | 0.403897 | -0.318968 | -0.459430 |
| **Kurtosis** | 2.113829 | 2.301731 | 1.501057 | 1.826416 | 2.579919 | 2.437014 |
| **Jarque-Bera** | 4.356354 | 2.827139 | 5.497179 | 4.482544 | 1.191172 | 2.370902 |
| **Probability** | 0.113248 | 0.243273 | 0.064018 | 0.106323 | 0.551239 | 0.305608 |

The highest inflation rate experienced in the country over the period is 19.2% with the least being 1.2%. From the average inflation value during the period (8.5%), the target of 5% has not been realized. On the real exchange rates, the mean over the period is 84.1. Highest real exchange rate during the period is 107 and the least is 64.9. Equally, real GDP growth rate, Central bank interest rate money supply growth and oil prices have been fluctuating. During the study period the nation realized the highest growth rate of 8.4% and least value of -2.5%. This is also way below the anticipated economic growth of double digit as the average growth mean for the period remains 4.3%.Similarly, while CBR has stabilized around 10.3%, it has varied between a minimum of 4.2% and a high of 18.5%. Likewise, during the same period, money supply growth has varied between 0.12% and 28% with a mean of 13.8%. In the same way, oil prices have been fluctuating between 123 and 19 with an average of 62.

### 4.2 Trend analysis

#### 4.2.1 Trend Analysis for Exchange Rates

Figure 2 indicates that Exchange rates remained steady from 2001 to 2003 before dropping gradually in the subsequent years from 2004 to 2008.

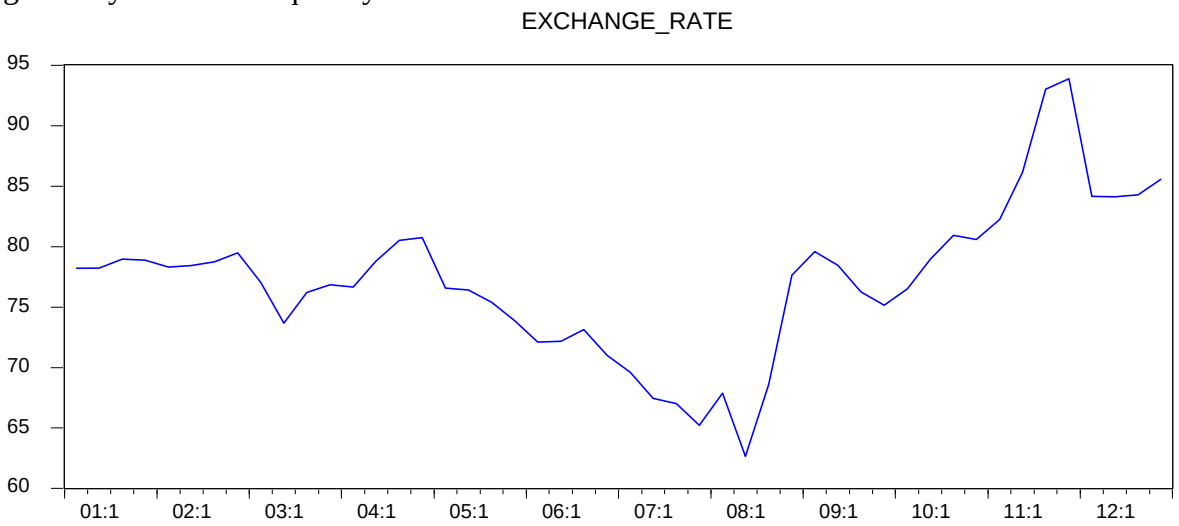


**Figure 2: Quarterly trend for Exchange Rates analysis from 2001 to 2013**

This subsequent drop is attributable mainly to the strong economic growth posted during this period and thus positively impacting on the performance of the exchange rates as well. However in the period 2009 to 2013 there is a rise in the exchange rates due to a slump in economic growth that was orchestrated by the effects of post-election violence.

#### 4.2.2 Trend Analysis for Real GDP

Figure 3 indicates that real GDP gradually increased from 2002 to 2007 before significantly dropping in the subsequent years from 2008 to 2009 due to the negative effects of post electionviolence .

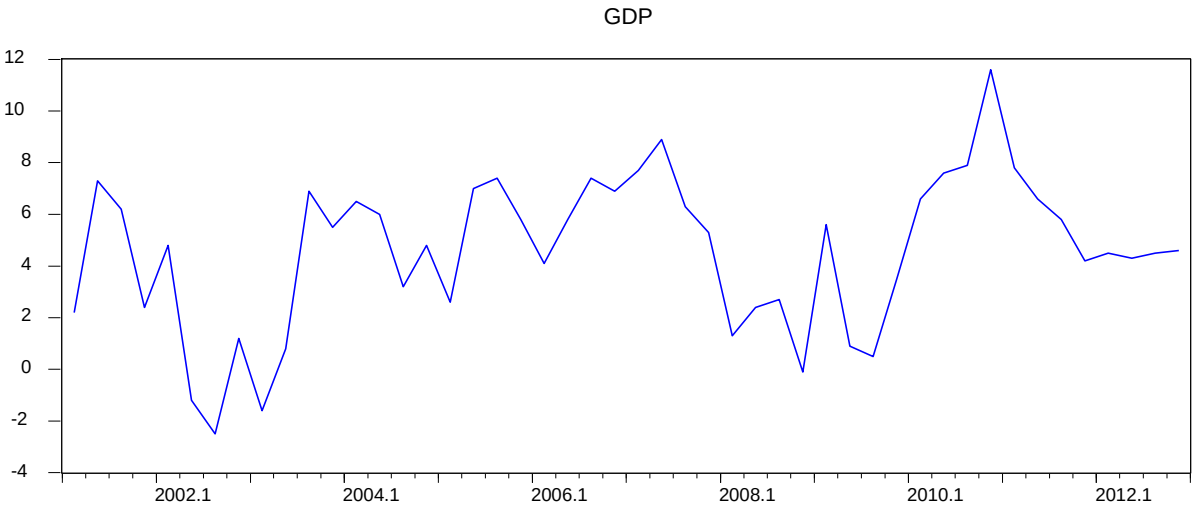

**Figure 3: Quarterly trend for real GDP analysis from 2001 to 2013**

The economy resumed a recovery path which saw the real GDP rise in theyears 2009 to 2011 before slightly declining again in 2012 due to uncertainties occasioned by the pending 2013 elections and transition into a new political regime.

### 4.2.3 Trend Analysis for Inflation Rate

Figure 4 indicates that the general trend of inflation rate has been fluctuating. Between the years 2001 and 2002, there was a decline in inflation rate.

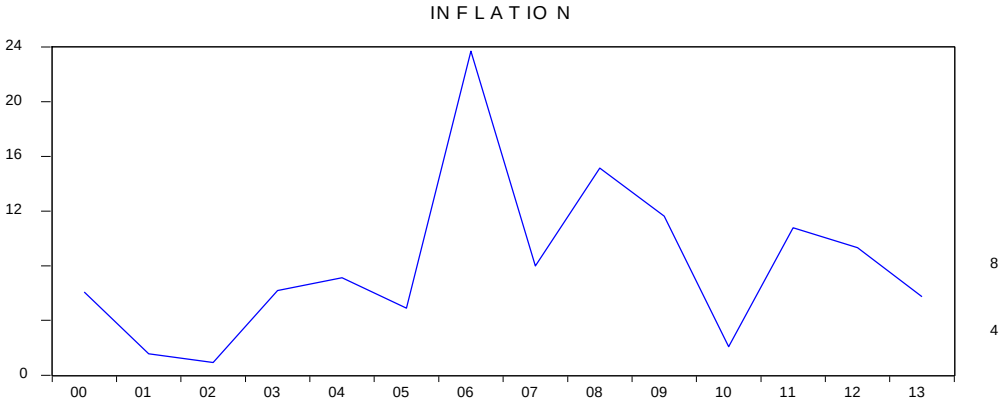


**Figure 4: Quarterly trend for Inflation Rate analysis from 2001 to *2013***

This was attributed to the tightened monetary policy by the Central Bank of Bank which saw the shilling stabilizing and interest rates declining. From the year 2003 to 2005, inflation rate rose gradually due to increasing food and fuel prices then stabilized between the year 2006 and 2007. However there was a sharp increase in inflation rate in the year 2008 to 2010 occasioned by internal shocks (post-elections disruptions, unfavorable weather conditions and high cost of food and fuel prices) and external shocks (high crude oil prices and global financial crisis).The tightening of monetary policy, together with an easing in global food and fuel prices, saw the levels of inflation come under control in 2012.

### 4.2.4 Trend Analysis for Interest Rates

Figure 5 show that interest rates have been declining from the year 2001 to 2004.

INTEREST_RATE

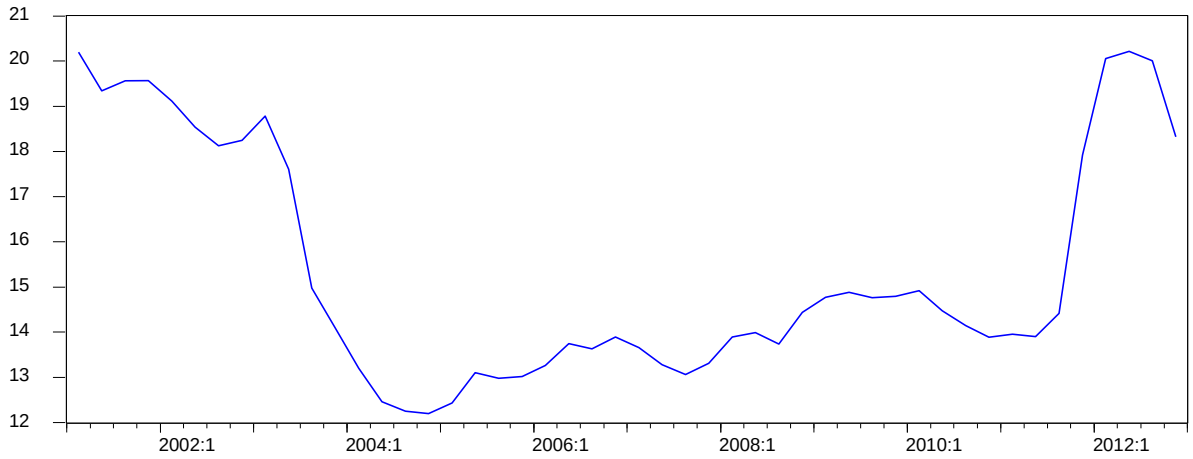


**Figure 5: Quarterly trend for Inflation Rate analysis from 2001 to 2013**

This decline was associated with the tightening of monetary policies by the central bank.Between the year 2005 and 2011; interest rate rose gradually and reached its peak in the year 2012.

### 4.3 Regression Results on the Monetary Determinants of Inflation Rate

The regression results in table 3 show that real GDP growth is negatively and significantly related to inflation rate.

**Table 3: Regression Results on the Determinants of Inflation**

```
. reg inflation Interest_Rate M3Growth rgdpgrowth reerchanges Price_Index laginflation

      Source |       SS       df       MS              Number of obs =      47
-------------+------------------------------           F(  6,    40) =   21.89
       Model |  995.814939     6  165.969157            Prob > F      =  0.0000
    Residual |  303.315521    40  7.58288803            R-squared     =  0.7665
-------------+------------------------------           Adj R-squared =  0.7315
       Total |  1299.13046    46  28.2419665            Root MSE      =  2.7537

------------------------------------------------------------------------------
   inflation |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Interest_Rate |   .2694861   .1769741     1.52   0.136    -.0881919    .6271641
    M3Growth |   .0485987   .0822021     0.59   0.558    -.1175378    .2147351
  rgdpgrowth |  -.5150369   .1567125    -3.29   0.002    -.8317647    -.198309
 reerchanges |   .0573222   .0925976     0.62   0.539    -.1298248    .2444688
Price_Index |   .0375336   .0153427     2.45   0.019     .0065248    .0685423
laginflation |   .7876078   .0815265     9.66   0.000     .6228367    .9523789
       _cons |   5.017119   2.562744     1.96   0.057    -.1623078    10.19669
------------------------------------------------------------------------------
```

This implies that inflation reduces with an increase in Real GDP. This is consistent with the results of Kigume (2011) who also found that there existed an inverse relationship between inflation and economic growth in Kenya.

Further the results show that price fluctuations (changes in oil prices) are positively related to inflation rates. This implies that a wide fluctuation in the prices of oil would eventually result to an increase in the levels of inflation. These findings are consistent with those of Olubusoye and Oyaromade (2008) who also found that lagged inflation and petroleum prices propagate the dynamics of inflationary process in Nigeria.

### 4.4 Regression Results on the Non-Monetary Determinants of Inflation Rate

The study also established that the previous period's inflation rate (lag inflation rate) positively and significantly affected inflation rates of the current period. This implies that the higher the inflation rates of the previous period would translate to a higher inflation rate in the current period. These results are consistent with those of Akbari and Rankaduwa (2006) who also established that the, one year lagged values of interest rate positively and significantly affect inflation.

### 4.5 Non-Linearity of the Inflation Model

The results for the test of non-linearity are presented in the table 4 below. **Table 4: Non-Linearity Test of the Inflation Model**

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| Model | 1037.49898 | 11 | 94.3180889 | Number of obs | = 47 |
| | | | | F( 11, 35) | = 12.62 |
| Residual | 261.631482 | 35 | 7.4751852 | Prob > F | = 0.0000 |
| | | | | R-squared | = 0.7986 |
| | | | | Adj R-squared | = 0.7353 |
| Total | 1299.13046 | 46 | 28.2419665 | Root MSE | = 2.7341 |

| inflation | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| M3Growth | .161329 | .2507968 | 0.64 | 0.524 | .6704735 | .3478154 |
| Interest_Rate | .0184779 | .723336 | 0.03 | 0.980 | 1.449972 | 1.486928 |
| Price_Index | .0371244 | .0159035 | 2.33 | 0.025 | .0048386 | .0694102 |
| rgdpgrowth | .2613947 | .4945106 | 0.53 | 0.600 | .7425151 | 1.265305 |
| reerchanges | .040948 | .1217379 | 0.34 | 0.739 | .2880819 | .2062003 |
| laginflation | .027157 | .4239879 | 0.06 | 0.949 | .8335834 | .8878992 |
| squaredM3 | .0059831 | .0083215 | 0.72 | 0.477 | .0109104 | .0228766 |
| squaredInterest | .022582 | .0311905 | 0.72 | 0.474 | .0859028 | .0407372 |
| squaredrGDP | .093993 | .0606271 | 1.55 | 0.130 | .2170725 | .0290866 |
| squaredREER | .0088042 | .0112177 | 0.78 | 0.438 | .0139689 | .0315772 |
| squaredlaginf | .0369946 | | | | | |

```
0 2 0 2 0 6      1 . 8 3     0 . 0 7 6      . 0 0 4 0 2 7      . 0 7 8 0 1 6 2           _ c o
n s      7 . 6 4 9 2 1 7     5 . 4 0 3 8 3      1 . 4 2     0 . 1 6 6     3 . 3 2 1 1 4 2      1
8 . 6 1 9 5 8
```

When linear regression is conducted the assumption is always that there exists a linear relationship between the predictor and the predicted variables. If this assumption is violated, the linear regression will try to fit a straight line to data that does not follow a straight line. Most inflation models estimated usually adopt a linear approach and thus this study sought to establish whether the inflation model does follow the linear relationship or it follows a non-linear structure. To achieve this there are two ways that non-linearity can be added to an OLS model. The most common one is to add the quadratic version of a continuous variable to the model. The second is to decompose the x-variable into a set of dummy variables. The study used the first approach where the quadratic terms of the predictor variables were included in the model (Justification of picking the second option).

## 5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Summary of Findings

The first objective of the study was to determine monetary determinants of inflation in the Kenyan Economy. The results revealed that Money supply growth, Foreign Exchange rate and interest rate do not have a significant relationship with inflation. This is inconsistent with the findings of the study by Ndun'gu (1996) who found that monetary growth, exchange rate changes and interest rate changes all have significant effects on the rate of inflation.

The second objective of the study was to investigate Non-monetary determinants of inflation in the Kenyan Economy. The results revealed that real GDP growth is negatively and significantly related to inflation rate. The results also revealed that price fluctuations (changes in oil prices) are positively related to inflation rates. The previous period's inflation rate (lag inflation rate) was also found to be positively and significantly affecting inflation rates of the current period. These results imply that Price fluctuations and Lag inflation rates greatly affect inflation rate positively while real GDP growth affects inflation rate negatively.

These findings are consistent with those of the study by Olubusoye and Oyaromade (2008) that analyzed the main sources of fluctuations in inflation in Nigeria and found out that lagged inflation and petroleum prices were among the factors that significantly propagate the dynamics of inflationary process in Nigeria.

Lastly the third objective of the study was to test for possibility of non-linearity in the inflation model in Kenya. The results revealed that the inflation model exhibits a linear structure as the coefficients of squared terms of the predictor variables were found to be statistically insignificant.

### 5.2 Conclusions

Based on the findings above the study concluded that Money supply growth, Foreign Exchange rate and interest rate do not affect inflation. From these findings, the study therefore asserts that there is no significant relationship between Money supply growth, Foreign Exchange rate and interest rate and inflation.

Based on the findings above the study concluded that real GDP growth, price fluctuations (changes in oil prices) and the previous period's inflation rate (lag inflation rate) are the ideal factors that

affect inflation in Kenya. From these findings, the study therefore asserts that there is a significant relationship between real GDP growth, price fluctuations (changes in oil prices) and the previous period's inflation rate (lag inflation rate) and inflation

Based on the findings above the study concluded that Kenyan inflation model exhibits a linear structure. Most inflation models estimated usually adopt a linear approach and thus this study obtained similar results.

### 5.3 Recommendations

Several policy implications emanate from the study. Firstly, Real GDP growth is the main instrument policy makers should aim at in controlling the inflation rate. According to the results, real GDP growth is a significant determinant of inflation rate during the study period. An increase in real GDP leads to a decrease in inflation rate. Therefore policy makers should adopt fiscal policies that spur the real GDP growth. Policies geared towards increasing capital formation can be used to spur GDP growth. Capital formation has a positive relationship with GDP growth. If it is increased, then GDP growth will also rise. Capital can be formed by a Fiscal policy which involves Reinstituting the investment tax credit. The investment tax credit has been a frequently used instrument of tax policy. An investment tax credit subsidizes investment by allowing businesses to deduct a percentage of their investment from their taxes

Another fiscal policy that can be used is a policy that involves replacing capital income taxation by consumption taxation. Replacing the income tax with a consumption tax is a policy favored by many economists. The taxation of capital income retards capital formation because the returns to saving and investment are distorted. If the taxation of capital income is the problem, then the solution is simply to choose a tax system that does not tax capital income.

Secondly, price fluctuation (changes in oil prices) is another main instrument policy makers should aim at in controlling the inflation rate. According to the results, price fluctuations (changes in oil prices) are also a significant determinant of inflation rate. An increase in Oil prices leads to an increase in inflation rate. Therefore policy makers should adopt stabilization policies to deal with economic shocks that may put short-run pressure on factors that drive inflation. The stabilization policies should aim to cushion frequent price fluctuations or put it under control. For instance, because of its wide utilization in the manufacturing sector; oil prices affect the prices of other commodities and the cost of transport. Thus, the central bank might require every oil distributor to hedge for their exposure to oil price fluctuations in derivative markets in an effort to cushion the economy against price instability introduced by oil price changes.

### 5.4 Suggestions for further research.

The study sought to investigate the monetary and non-monetary factors that affect inflation rates in Kenya. This study therefore suggests that further studies should include more variables like the macroeconomic factors (Increase in disposable income, Expansion of Credit, Deficit Financing, Black money spending, Expansion of the Private Sector, Increasing Public Expenditures, Industrial Disputes, Natural Calamities, Artificial Scarcities and Global factors) that affect inflation on a separate scope so as to unearth the determinants of inflation rate in much detail.

A similar study can also be conducted by comparing determinants of inflation among different countries and collecting data from both secondary and primary sources then analyzing it using panel data analysis.

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