Inflation and Saving: A puzzle

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Abstract

In the wake of the steep fall in the national savings due to economic shocks, among them the COVID-19 pandemic macroeconomic consequences, this study examines to what extent inflation explains the variation in the saving behavior in developing countries. Most past empirical studies investigated the role of inflation on savings only in advanced nations. The current study will investigate the effect of inflation on savings culture in Kenya. To determine how inflation explains saving, the study use**s** the *ordinary least squares*(*OLS*) estimation technique. From regression analysis findings, savings are positively related to inflation, economic growth, and interest rate. In contrast, consumption expenditure is negatively related to national savings. From estimation results, in Kenya, high inflation will stimulate further growth in the national savings. This finding is puzzling as it contradicts the implications of most monetary general equilibrium models. Expansionary inflation result implies that the central bank should vitalize inflation, to promote a higher saving culture in Kenya.

1. Introduction

The piecing together of inflation and savings is an imperative state in evaluating economic performance of developing nations. Worldwide, inflation remains one of the macro-economic variables that are of concern to both developed and developing economies. In particular, the impact of inflation on savings stands out as a concept that appeals to the attention of not only the public sector and household but all stakeholders in any economy. The stimulation resulting from high inflation may result to impacting of real wealth by depressing its real value of financial assets (Wachtel, 1977). On the other hand, the wealth effect would slow consumption and therefore augment gross savings. This would result from a switch from demanding financial assets to real assets driven by consumers' response to unanticipated inflation and therefore end up economy saving involuntarily (Deaton, 1977; Thomi & Mose, 2021).

To a greater extent, most empirical studies of inflation and savings relationship, generally observed that households and governments respond to the rising price level of goods and services by cutting back on general consumption and borrowing, thereby increasing their aggregate national saving (Wachtel, 1977). Thus if the positive relationship between inflation and saving no longer holds with COVID 19 and economic shocks, a rising rate of the general price level in the future will not guarantee a higher average rate of household or government

saving. This development could hurt the economic growth progression of an individual country or devolved units since reduced general savings tend to slow the future supply of funds for investment and capital infrastructure development in developing countries. However, the traditional economic theory indicates that inflation has no significant impact on average saving, except under certain macroeconomic conditions, to generate readjustments in some components of household wealth. The theoretical evidence on the effects of inflation on gross savings in developing countries is mixed and inconclusive.

1.1 Inflation and Savings relationship in Kenya

National savings which result from the amalgamation of private and public savings of a nation is vital to economic growth and development. From a global view, savings rates vary from one region to the other, for example at least 40% of East Asia's gross disposable income is saved as compared to 20% of Sub-Saharan Africa. A variety of presumptions may be adopted to explain this phenomenon with inflation being amongst the economic shocks in consideration. Based on the India's Planning Commission data, the period between 2007 and 2008 depicted that India's savings rate declined to 30% from 37%. The slowdown in savings was attributed to the cyclical factors that included low incomes and high inflation. Further to the cyclical factors, the rising dependency ratio resulting from the change in demographic structure affected savings since the population engaged in generating income reduced. What stands out in India's economic growth rate is the sensible inflation management and growth in savings (World Bank, 2015). This implies that inflation has to be kept in check to avoid it becoming detrimental to the savings.

In the period of 1980s, Kenya's savings was greater than most of its peer countries. Currently, this is not the case over the past decade; Uganda, Tanzania, Senegal, and Ghana have overtaken Kenya in terms of savings (World Bank, 2015). The inflation rates that have been perceived to affect saving growth rate have been attributed to several factors with the least growth of - 0.80% in 1992 (World Bank, 2013) followed by the highest inflation rate in 1993 at 45.98%. Figure 1 presents the gross savings trend in Kenya for the period 1980 and 2014.
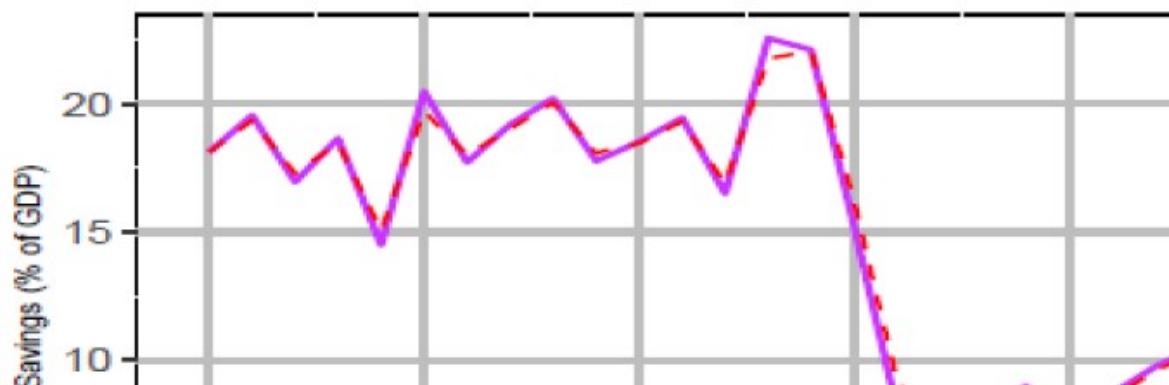
Figure 1: Kenya's Gross Domestic Savings Trend.

Source: World Bank (2015).

The straightforward dissimilarity between willingness to save and determinants of the ability to save is that the capacity relies on two main factors, that is the level of per capita income and growth of income. On the other hand, willingness to save is dependent on financial variables like inflation, financial deepening levels, and interest rates (World Bank, 2015; Thomi&Mose, 2021). Specifically, arguments have been put forward concerning inflation that it applies a mild positive effect which within a short instance turns negative and thus puzzling.

There is no doubt that savings mobilization is core in monetary and fiscal policy as a development process. In his work, Cheruiyot et al. (2012) termed it the surest way of increasing income and boosting productivity in an attempt to eradicate poverty in developing nations (Makori et al., 2022). This infers that unless there exists a corresponding rise in income levels the accumulated savings will end up being depleted (Labonte, 2011). Hence, the concern by both stakeholders and policymakers on the unpredictable relationship between inflation and savings culture in the globe.

Over time, a great deal has been put into studying the drivers of inflation rather than the effects of inflation, especially on savings. This is contrary to the ideal case which puts savings as a key precondition for developing countries to improve in economic growth and development. The hypothesis is ambiguous and practical in the effect of inflation on savings (Heer & Suessmuth, 2006; Deaton & Paxson, 1993). Since savings and inflation are interrelated variables, it is paramount to understand their complex relationship. This informs the need for this study to answer the following question: Does inflation exert a positive influence on savings? This paper examines these questions in the Kenyan context for the period 1975 to 2020.

1.2 Objective

This study aims at investigating the effect of inflation on savings in an open economy in Kenya for the period 1975 to 2020.

2. Review of Literature

2. 1 Theoretical Literature

The interrelationship between inflation and savings is highly dependent on households' reactions to changes in the inflation rate (Chopra, 1988). Should households alter their savings pattern by redirecting their savings to consumer durables and physical assets from financial then savings will decline. Conversely, individuals who are after sustaining real value, in an inflationary case, would increase their savings. In the life cycle theory of savings, the lack of established institutional structure and the existence of inflation would result in higher savings in the system (Chopra, 1988). According to Heer and Suessmuth (2006), a greater number of models that look into the effect of inflation on savings establish a negative effect. The explanation behind this is that in an unanticipated inflation cause the real income to decline and therefore the savings rate also reduces. Miller and Benjamin (2008) also gave a possible explanation that in high inflation there is an increased opportunity cost of holding money and increased the rewards for the search activities in shopping wasting real resources and thereby reducing savings.

However, Deaton and Paxson (1993) give a converse explanation of this relationship. Deaton's hypothesis portrays the existence of a positive relationship between the two (Deaton, 1977). It proposes that the savings rate can increase during unanticipated inflation if real income is accurately anticipated or indexed (Deaton, 1977; Deaton &Paxson, 1993). Therefore, in a macro economy, the higher the uncertainty the larger the potion of money saved for precautionary motives. This indicates that should inflation rates increase then the savings rates should as well increase.

The uncertain impact that results from inflation leads to a rise in savings, as captured by empirical hypotheses and theories. The hypotheses treat inflation as a proxy for attitudes about economic conditions, particularly uncertainty (Wachtel, 1977). Should the different groups within a household portray different propensities to consume and are subject to dissimilar taxation rates, then redistribution will affect the aggregate savings of these respective households (Howard, 1978). To a greater extent, inflation also interferes with other macroeconomic factors that determine savings behavior.

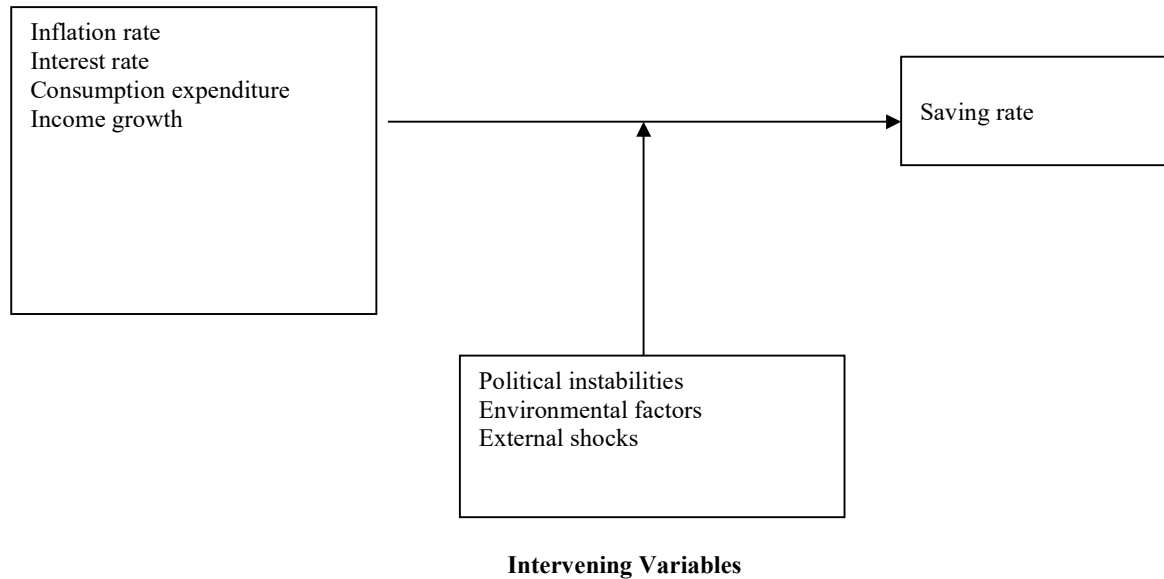*2.2 Empirical Literature Research Gaps*

The empirical literature in both the developed and developing countries have proven the existence of inconclusive outcome concerning the effect of inflation on saving. Some of the research findings on the relationship between inflation and savings include; the insignificant effect of inflation on saving (Den Haan, 1990; Chari et al., 1996; Celik & Kayali, 2009), and some findings portraying a negative effect (Ahimad & Muhamood, 2013; Osundinak & Osundina, 2014; Gylfason & Herbertsson, 2001) while some studies stating positive effect (Dholakia, 1995; Mallik & Chowdhury, 2001). For instance, Den Haan (1990) considers a shopping-time model where inflation distorts the allocation of time for shopping, leisure, and labor. With higher inflation, the opportunity costs of money increase, and agents reallocate more time to shopping activities. As a consequence, savings decrease. In addition, Emara and Kasa's (2020) study concluded that inflation is harmful to savings in India. Notably, Sidrauski (1967) studies a general equilibrium framework and finds that money is super neutral in the steady-state. Accordingly, inflation does not affect the savings rate in the long run. Therefore, this study will focus on reviewing the relationship between savings and inflation in Kenya. The driving motivation is to fill the indicated gap in the context of Kenya.

2.3 Conceptual Framework Analysis

The study postulates that inflation and other determinants of household and government savings determine the saving behavior in the Kenyan economy. In between the dependent and explanatory variables are the intervening variables that are not controlled for in the study. This relationship is conceptualized in Figure 2.

Independent Variables   **Dependent Variable**

Inflation rate
Interest rate
Consumption expenditure
Income growth

Saving rate

Political instabilities
Environmental factors
External shocks

Intervening Variables

Figure 2: Conceptual framework analysis.

3. Research Methodology

The study applied a quantitative study design to investigate the effect and trend of the inflation rate on the saving culture in Kenya. This was administrated within the period 1975-2020 using secondary data and the ordinary least squares (OLS) estimation technique. The study was meted out in a developing nation.

3.1 Research Study area

The research was carried out in Kenya. Kenya is located in the East African region. Kenya's latitude and longitude are 0.0236° S and 37.9062° E respectively (Gisore, 2021). Kenya's governance system consists of national government and county governments. Kenya's gross savings have been affected by external macroeconomic shocks and COVID-19 pandemics and related outcomes as most of developing countries. Figure 3 present the map of Kenya showing the location of the study area.

Figure 3: A Map of Kenya showing the location of the study area.

Source: Gisore (2021).

3.2 Data Sources and Description

This study applied the time series yearly data for 46 years taken from the period 1975 to 2020 from Kenya. The secondary data had been collected from different sources such as World Bank national accounts data, International Monetary Fund (IMF) database, and Kenyan statistical abstracts and economic survey reports. The different variables that are used in the estimation process such as saving which is the dependent variable, and inflation and economic growth, interest rate, and consumption expenditure are independent variables. In the investigation, the Ordinary Least Squares (OLS) estimation approach was applied. The description of the study variables is given in Table 1.

Table 1: Description of Variables

Variables	Description	Unit of Measurement	Source
S	Saving rate	Gross Savings (% GDP)	World Bank national accounts data
I	Inflation rate	Consumer prices (%)	International Monetary Fund database
Y	Income growth	GDP growth rate (%)	Kenyan Statistical Abstracts
R	Interest rate	Real interest rate (%)	International Monetary Fund database
C	Total Consumption	Final consumption expenditure	World Bank national accounts data

Notes: i– Inflation, r– interest rate, y– income growth, c– consumption, and s–savings.

3.3 Econometric Methodology

Building on Gisore (2021), a simple econometric saving growth function during which savings is an explanatory variable was formulated and presented as follows:

$$S_t = \beta_0 + \beta_1 i_t + \beta_2 y_t + \beta_3 r_t + \beta_4 c_t + \varepsilon_t \qquad (1)$$

ε_t - Error term, $\beta_0, \beta_1, \beta_2, \beta_3,$ and β_4 are slope coefficients.

Where,

$s_{i,t}$- Gross savings (as a percentage of GDP) as a proxy of savings;

$i_{i,t}$ - Consumer prices (annual %) as a proxy of the inflation rate. Inflation can stimulate or impede

the level of gross savings in a country;

$y_{i,t}$ - Real GDP growth as a proxy of income growth. The study expects a positive relationship between

income growth and savings. According to the permanent income theorem, higher income growth

translates to higher future savings growth (Friedman, 1957);

$c_{i,t}$ - Final consumption expenditure as a proxy of total consumption. Consumption increase is expected to

slow savings growth as captured in the theory of consumer behavior. If the expenditure budget

increases, agents would increase their consumption, hence, decrease saving (Modigliani &Brumberg,

1954; Loayza et al., 2000)

$r_{i,t}$ - Real interest rate as a proxy of interest rate. The study expects a positive relationship, as the interest rate

increases savings will accumulate. This can be attributed to the income effect, in other words, the lower

the interest rate, the higher the expected level of saving, because the lower rate of return from the

investment must be compensated by a higher saving rate.

3.4 Data Analysis

The study used the ordinary least squares (OLS) approach to analyze the relationship between the study variables. Unit root test is important to make sure all variables are stationary to avoid misleading and inconclusive results (Gisore, 2017). The study adopted Phillips–Peron unit root test which is positively built on the Dickey-Fuller test estimation approach. The test is robust concerning unspecified autocorrelation and heteroscedasticity in the disturbance process of the test equation. In addition, diagnostic examinations were applied to assess the validity of the regression analysis and to reduce endogeneity issues in the study. The main diagnostic tests include heteroscedasticity and autocorrelation test.

4. Findings

4.1 Descriptive Estimation Results

Table 2 presents the descriptive statistics of both the dependent and independent variables for the period 1975-2020.

Table 2: Descriptive Estimation

Variable	Observations	Mean	Standard Deviation	Min	Max
I	46	11.91027	8.136223	1.554328	45.97888
R	46	6.272396	7.127078	-10.096	21.09633
C	46	2.34e+10	2.58e+10	2.75e+09	9.03e+10
Y	46	3.854185	2.428679	-.799494	9.453798
S	46	15.71004	6.583931	5.014243	37.15646

Notes: **i**– Inflation, **r**– interest rate, **y**– income growth, **c**– consumption, and **s**–savings.

The average value of the interest rate is 11.9 units. The interest rate on average increased from the value of 1.55 and reached the maximum value of 45.98 percent in Kenya. The value for the standard deviation for the inflation rate in Kenya stood at 8.136223, implying deviation from the mean was minimal during the period. The gross saving average is 15.7, the savings increased from the value of 5.01 and go to the maximum level at the point of 37.15. The standard deviation in Kenya of savings was 6.583931 showing that savings did not deviate too much from the mean. The descriptive estimation result showed that in Kenya the real GDP stood on average at 3.9 percent. The real GDP is increased from -0.799494 percent and goes to the maximum level of 9.453798 percent.

The Consumer expenditure average value is 2.34e+10. The value increased from 2.75e+9 and go to the maximum level at the point of 9.03e+10 percent. Bivariate correlation was applied to determine the degree of variable relationship as captured in Table 3.

Table 3: Correlation Matrix Results

Variables	S	i	C	R	Y
S	1	0.567	-0.475	-0.046	-0.077
I	0.567	1	-0.368	-0.286	-0.365
C	-0.475	-0.046	1	0.070	0.069
R	-0.046	-0.046	0.070	1	-0.121
Y	-0.077	-0.046	0.069	-0.121	1

Notes: i– Inflation, r– interest rate, y– income growth,   c– Consumption, and s–savings.

The absolute value of the coefficient of correlation ranges from 0 to 1. In general, most independent variables seem to be negatively correlated between themselves. The saving function has a negative relationship with consumption expenditure, economic growth, and interest rate. However, the saving function was positively related to the inflation rate against theoretical expectations.

4.2 Econometric Results

The unit root test was employed to eliminate any possibility of spurious regressions and erroneous conclusions (Nyoni, 2021). Phillips-Peron unit root test was conducted to find out whether the variables were stationary at the level or whether they were non-stationary at the level and the result is reported in Table 4.

Table 4: Phillips-Peron Unit Root Test Results

Variables	Phillips-Peron at Level		Order	Phillips-Peron at First difference		Order
	t value	P-value		t value	P-value	
r	-4.449572***	0.0009	I(0)	_	_	_
y	-4.068307**	0.0026	I(0)	_	_	_
i	-3.798189***	0.0056	I(0)	_	_	_
c	5.247197	1.0000	I(1)	-5.980668***	0.0000	I(0)
s	-2.801566	0.0661	I(1)	-9.256772***	0.0000	I(0)

Notes: **i**– inflation, **r**– interest rate, **y**– income growth,   **c**– consumption, and **s**–saving

*** one percent level of significance, **five percent level of significance

From Table 4, interest rate, income, and inflation were found to be stationary at the level while the remaining variables, that is savings and consumption expenditure were determined to be stationary after first differencing that is integrated of order one. Table 5 reports the results of the OLS regression analysis.

Table 5: OLS Regression Results

Variable	Coefficient	Std. Error	t-ratio	Prob.
i	0.750565	0.073345	10. 23330	0.0000***
r	0.333182	0.108230	3.078453	0.0037***
y	1.234034	0.267585	4.611752	0.0000***
c	−7.36875e-011	3.22453e-011	−2.285	0.0275**
cons	9.27266	3.05194	3.038	0.0041***
The goodness of Fit Test	Adjusted R-squared = 0.439227			
F-Statics	F(4,41)= 8.028357 P-value(F) = 0.000071			
Breusch-Godfrey Serial Correlation LM Test	F(1,41) = 18.37513 Prob> F = 0.0001			
Breusch-Godfrey Heteroskedasticity Test	F(4,41) = 1.361759 Prob> F = 0.2639			

Notes: **i**– inflation, **r**– interest rate, **y**– income growth,   **c**– consumption, and **s**–saving

The regression result reveals that the inflation rate is positively significant in Kenya in relation to gross savings at a five percent level of significance. This suggests one percent increase in the inflation rate will translate to about a 0.75 percent increase in the saving rate. In general, there is a positive relationship between the two but in past empirical studies, there exists a negative affiliation. As inflation increases people maintain their assets and wealth and thus savings increase (Labonte, 2011; Dash & Kumar, 2018). As captured in the life cycle theory of savings, the lack of established institutional structure and the existence of inflation would result in higher savings in the economic system (Chopra, 1988; Deaton &Paxson, 1993). The results agree with Chaturvedi et al. (2008) study in Asia; they found a positive relationship between saving and inflation. The findings support Deaton's hypothesis that unanticipated inflation my lead to involuntary savings in Kenya (Deaton, 1977; Deaton &Paxson, 1993). In addition, Deaton and Paxson (1993) portrays that the savings rate can increase during unanticipated inflation if real income is accurately anticipated or indexed. Therefore, in a macro economy, the higher the uncertainty the larger the potion of money saved for precautionary motives. This indicates that should inflation rates increase then the savings rates should as well increase (Deaton, 1977). The finding contradicts a similar study by Emara and Kasa (2020), who reported a negative relationship between inflation and savings in India. The finding showed that the saving rate diminishes due to the inflation rate in India. The study concluded that inflation is harmful to savings. Finally, Den Haan (1990) considers a shopping-time model where inflation distorts the allocation of time for shopping, leisure, and labor. With higher inflation, the opportunity costs of money increase and agents reallocate more time to shopping activities. As a consequence, savings decrease.

From the findings, the econometrics result recorded a positive and significant relationship between interest rate and national savings. This implies one percentage increase in interest rate will stimulate 0.33 increases in savings. The lower interest rate may stimulate increase in saving rate because the rate of return per financial instrument is so low that the population may try to compensate by increasing their aggregate amount of savings (Nabar, 2011). Most empirical works argue that increasing the interest rate will stimulate savings while discouraging consumption and new investment, but in some cases, a low-interest rate may also prompt the population to increase their savings to compensate for expected lower returns (Masson et al., 1997; Nabar, 2011; Mose, 2021). The changes in the interest rate could have a substitution effect on saving; for example, the lower the interest rate, the higher the level of consumption and investment, that is, leading to a lower level of saving (Loayza et al., 2000). Masson et al. (1997) reported a positive effect of interest rates on saving while Loayza et al. (2000) noted a negative effect between two variables.

Income growth is positively significant in relation to savings in Kenya. This suggests one percent increase in income will translate to about a 1.23 percent increase in aggregate savings. The high income growth will translate to high saving rate if employees have high saving tendency. As captured in the permanent income hypothesis (Modigliani &Brumberg, 1954; Friedman, 1957; Rasmidatta, 2011), higher income growth, which may represent higher future growth, should translate to higher savings in the economy.

Consumption spending was negative when regressed in the saving growth function. This suggests one percent increase in public and private consumption will translate to about a 0.01 percent decrease ingrosssavings. This also means that more savings, specifically in developing countries, leads to less consumption, which could also result in a larger amount of capital investment and finally a higher rate of economic growth (Modigliani &Brumberg, 1954; Rasmidatta, 2011; Mose, 2021).

The coefficient of determination (adjusted R^2) shows that 44 percent of the dependent variable is explained within the model which implies it fits the regression function well. The F test result indicates that all the independent variables have explanatory power at a 1percent level of significance. The Breusch-Godfrey heteroscedasticity test is designed to ascertain whether or not there exists a heteroscedasticity issue. There is no problem with heteroscedasticity in the model if the p-value is more than the significant level of 5 percent; however, if the p-value is less than the significance level, there is a problem with heteroscedasticity in the model. The Table 5 illustrates that the p-value is greater than the significance level which shows there is not found the problem with heteroscedasticity. The Breusch-Godfrey Serial Correlation LM test shows there is a serial correlation. This study used robust standard error to correct the serial correlation problem.

5. Conclusion and Implications

This study estimation affirms that the inflation rate has a positive and significant effect on savings in Kenya. This implies that increase in inflation rate results to growth of savings in Kenyan economy. Many studies demonstrate that inflation hurts gross savings in an economy but in this study, the findings show inflation stimulates gross savings. The findings support Deaton's hypothesis that unanticipated inflation my lead to involuntary savings in Kenya. While the income growth, interest rate, and consumer expenditure have mixed

results but there is substantial influence on gross savings in Kenya. In itself, savings is just but a means to achieving higher income and not an end. With higher income, then attaining better living standards is possible. This therefore calls for better policies that focus on increasing savings rate to follow which will stimulate further income growth within the Kenyan economy.

Based on the findings the research would recommend that the government and the policymakers should be responsible for actions that will help to increase the saving by stimulating the inflation rate. In the current study, in Kenya, inflation has a favorable and considerable effect on savings growth as evidenced by the influence of the inflation rate on savings being positive. Informed of this, the government should control the money supply to control the inflation rate and should try to maintain inflation at an optimal level. In addition, the focus should be on the applicable optimal level of inflation rate in order to stimulate national saving.

From the findings of this study, there's a necessity for further national savings data disaggregation into public savings and private savings for deeper policy prescription.

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