Effect of Change in Macroeconomic Variables on Aggregate Private Investment Growth in Kenya

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Abstract

Purpose: Aggregate private investment is key in stimulating economic growth and development of a country such as Kenya. However, the sector seems to be influenced by changes in macroeconomic variables. Therefore, the study aimed at determining the effect of change in macroeconomic variables on aggregate private investment growth in Kenya. It focused on the effect of changes in interest, inflation and exchange rates on aggregate private investment growth in Kenya as the key objectives of the study.

Methodology: The study adopted the quantitative causal research design. Secondary data obtained from the World Bank was used, with a time scope of between 1972 and 2023. Data was analyzed through exploratory and inferential analyses via R software. Cointegration analysis was carried out through the Johansen test and both the Maximum Eigenvalue and Trace tests indicated the absence of cointegration relationships since the test statistic values were less than the critical values at $\propto = 0.05$. Thus, ARDL estimation technique was adopted.

Findings: The study's findings indicated that change in interest rate had a statistically significant negative effect on aggregate private investment growth in Kenya (P-value < 0.05). Furthermore, the study revealed that such effect wasn't instant but was translated after three years. The study further found that change in inflation rate had a statistically significant positive effect on Kenya's aggregate private investment growth (P-value < 0.05). Likewise, such effect was felt on aggregate private investment after eight years. Finally, the study showed that change in exchange rate did not have any significant effect on aggregate private investment growth in Kenya (P-value > 0.05).

Unique Contribution to Theory, Practice and Policy: The study recommends the need to manage the changes in macroeconomic variables including inflation and interest rates within their target range as prescribed by the "monetary policy" so as to ensure macroeconomic stability and boost aggregate private investment growth in Kenya.

Keywords: *Aggregate Private Investment, ARDL, Change in Exchange Rate, Inflation Rate, Interest Rate*

JEL Codes of Classification: E220, *C220, F310, E310, E430*

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INTRODUCTION

Investment refers to the additions made on the stock of capital at a given period of time. It is viewed as a requisite factor for economic and social development. According to Robinson (2021), nations with higher levels of economic growth have recorded a proportion of investment to GDP of above 25 percent over time. This implies that the levels of investment of a country whether developed or less developed plays a vital role in blossoming the economy.

Private sector activities and investments are the key stimulants for economic growth, job creation and sustainable development in Africa. According to the United Nations Economic Commission for Africa report (2020), the private sector lends more than 80 percent of government revenues in low-and middle-income countries through company taxes, resource rents and income taxes on employees. Furthermore, the sector generates more than 90 percent of employment in developing economies, including both formal and informal jobs. Hence, nations all over the world strive to achieve and sustain high levels of growth rates of their output through macroeconomic policies strategies and domestic private sector investments for economic growth and transformation (Muthamia, 2020).

In most African countries, macroeconomic volatility generally induces risk premia for long-term arrangements, increases production costs, contracts trade, causes unanticipated redistribution of wealth and results into fluctuation in the real economy (Oseni, 2016). This adversely effects on unemployment rate, poverty rate and growth rate. Furthermore, according to Guney (2018), the change in macroeconomic variables influences decision making process on investment ventures in various ways. For instance, change in exchange rate brings in complications in predicting the relative advantages of investing in traded or non-traded goods sectors. Likewise, change in interest rate makes it hard to determine the value of new investment for investors in developing countries. Whereas, change in inflation reflects macroeconomic instability since inflation is an overall indicator of macroeconomic wellbeing of a nation. Such kinds of volatilities end up discouraging private sector investments within a country (Guney, 2018). This is too supported by Omondi (2022) in that macroeconomic volatility results in a decrease in investment levels, consumption and factor productivity over the long run.

Kenya's macroeconomic indicators have changed over time as a result of governmental actions and forces of demand and supply. Some of the macroeconomic issues that the country has faced include rising price levels (inflation rates), increasing rates of interest, rising external debt and a weak exchange rate. Such adverse macroeconomic trends do cause serious issues with the private sector investments (Omondi, 2022).

Aggregate Private Investment and Change in Macroeconomic Variables in Kenya
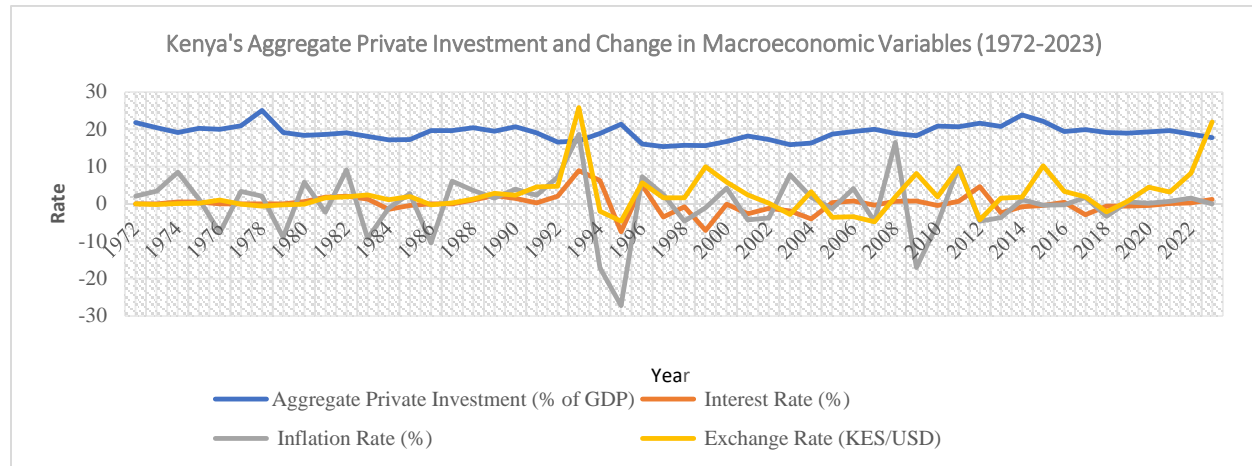
Figure 1: Trend of Aggregate Private Investment and Change in Macroeconomic Variables in Kenya (1972-2023)

Kenya's aggregate private investment exhibited a declining growth trend in the early 1970s till 1974. Thereafter, the growth began portraying an upward growth trend upto 1978, recording its highest value of 25.08 percent of GDP that year. The growth declined sharply to 17.27 percent in 1985. It rose at an average of 19.96 percent of GDP until 1990 where the growth declined to 16.58 percent of GDP in 1992. Aggregate private investment shot upward sharply to 21.39 percent of GDP in 1995 and decreased abruptly to 16.01 percent of GDP in 1996. Thereafter, aggregate private investment growth commenced rising upward slowly and inconsistenly up to 2014 whose value stood at 23.88 percent of GDP. The growth began falling consecutively afterwards reaching to 17.75 percent of GDP in 2023. General, the Kenya's private sector seems to be growing, even splendidly at times, though at equilibrium, the growth does not reach its full growth potential consistently. This could have been attributed to the changing macroeconomic indicators ranging from high and rapid changes in inflation rates, interest rates and exchange rates (AfDB, 2022).

The Kenya's rates of interest were low, stable and generally demonstrated a predictable pattern prior to libralization. The pattern changed after liberalization where the rates were characterized by increased changes and instabilities. The change in the rates of interest averaged to 0.0882 percent between 1972 and 2023. Such changes in interest rates have negatively impacted the growth and performance of the real estate sector (Brian, 2018) and stock market returns (Mburu, 2020) in Kenya. Furthermore, interest rate volatility had influenced the financial performance of commercial banks positively at the NSE (Shukrani, 2020).

The Kenya's rate of inflation has been highly volatile since independence. Higher level of change in inflation rate was recorded in 1993 at 18.65 percent, with a minimum value on the other hand of -27.26 percent in 1995. The rate of change in inflation averaged to 0.0748 percent over the period between 1972 and 2023. Such change in inflation rate significantly affected the performance of the real estate sector positively in Kenya (Omondi, 2022). Moreover, uncertainties experienced in the rate of inflation significantly influenced the performance of the domestic private sector negatively in Kenya (Mmeri, 2020), similar to Poland (Guney, 2018).

The country, Kenya operates under a flexible exchange rate regime. The regime is subjected to fluctuations over time. The country recorded a maximum value of change in exchange rate of 25.78 KES/USD in 1993, with a minimum value of -4.783 KES/USD in 2007. The average change in exchange rate from 1972 to 2023 was 2.552 KES/USD. Such changes in exchange rate positively influenced the financial performance of commercial banks in Kenya (Majok, 2015), similarly to the Kenya's agricultural sector financial performance (Wanguru, 2019).

Statement of the Problem

Private sector investments play a notable role in accelerating long-term economic growth and development of a country. In this regard, African countries are expected to uphold an aggregate investment level of 40 percent of GDP and maintain a minimum growth rate of 10 percent of GDP. This will enable the continent to achieve its goal of inclusive growth and sustainable development in Africa at large (AfDB, 2023).

Kenya's aggregate private investment grew at an average of 19.09 percent of GDP over the period between 1972 and 2023 with a value of 17.75 percent of GDP in 2023. In comparison to the Africa's Development and the Kenya's Vision 2030 blueprints' targets of more than 32 percent of GDP, such investment levels are still low despite the government's tremendous efforts to improve them. Notably, Kenya's private sector has been thriving, even augustly at times but at equilibrium, the growth has not yet reached its full growth potential consistently over the years. The inconsistencies associated with the Kenya's private sector growth might be attributed by the nature of the macroeconomic environment. Previous studies done especially within Kenya mostly focused on specific sectors including the real estate sector, agricultural sector, stock market and commercial banks with heterogeneous results. The study therefore sought to determine the effect of change in macroeconomic variables on aggregate private investment growth in Kenya.

LITERATURE REVIEW

Theoretical Review

Keynesian Theory of Interest Rate

The theory was developed by John Maynard Keynes in 1936. According to Keynes (1936), the theory refers to the market interest rate which depends on demand and supply of money. He identified three motives for holding money namely; the transaction motive, the precautionary motive and the speculative motive (Shukrani, 2020). The speculative motive being the desire to hold cash for exploiting any investment opportunity is the departure of the Keynes' theory of interest rate.

According to Appelt (2016), the liquidity preference as a result of the speculative motive is highly sensitive to the change in the rate of interest. This is further proven in the Keynes' General Theory of Employment, Interest and Money which states "the aggregate demand for money to satisfy the speculative motive usually shows a continuous response to gradual changes in interest rate." Higher levels of change in interest rate hamper the production of goods and foster unemployment due to a decrease in investment while a reduction in the change in interest rate results into an increase in investment rates as well as liquidity preference due to increased consumption (Appelt, 2016). Therefore, Keynes accentuates that monetary authorities influence investment processes by regulating the amount of money and the decisions made by individuals in regard to liquidity

through the speculative motive (Appelt, 2016).The theory only accounts for the effect of the changes in the rate of interest on investment.

Flexible Accelerator Theory

The theory was developed by H.B. Chenery and L.M. Koyck in 1952. The theory explains the existence of a positive relationship between investment *(I)* and change in output or income (*Y*). It further elaborates the nexus between capital stock (*K*) and the rate of change in output (*Y*) using lags between the level of output and capital stock in the adjustment process with the assumption that capital stock (*K*) depends on all past output levels. According to Mmeri (2020), the theory affirms that a firm's higher rate of investment depends on the magnitude of the interval between the desired and the existing stock of capital. This follows in the essence that a firm's desire is to bridge the prevailing interval between the desired and the existing stock of capital (*K*).

Given that the income of a country increases, more goods and services have to be produced to meet the increased demand. This means the country requires some additional capital to mend the situation in the economy. In such course of events, the change in the rate of income or output induces investments. The theory recognizes other factors with influence on investment.

Tobin's Q Investment Theory

This theory was introduced by James Tobin in 1969. The theory associates investments decision-making by firms to the fluctuations encountered in the stock market. The theory holds that investment is majorly driven by the proportion of the firm's present value of the already installed capital stock to the cost of replacing the existing capital stock denoted by Q (Gitonga, 2020). Hence, Q is related to the firm's investment rate and represents the ratio of the market value of a firm's capital stock and the replacement cost of the capital stock. It contains and summarizes all future information required by a firm to facilitate its investment decision making process.

Tobin emphasizes that the ideal situation for the firm is when *Q* is unitary (at equilibrium). Nevertheless, *Q* keeps shifting from equilibrium due to a rise in marginal cost of investment and delivery lags. Therefore, a firm should invest when *Q > 1* due to a higher profit attraction (profit greater than its assets costs) and vice versa (Mmeri, 2020). The theory does not factor in the effect of changes in any macroeconomic variable on investment.

Eclectic Theory

The theory was propounded by Nobel Laurate Dunning in 1976. According to this theory, a firm engages in direct investment activities up on satisfying three conditions namely the ownership advantages, the location advantages and the internalization advantages (Makoni, 2015). The O-advantages, L-advantages and I-advantages synonymized the theory as the OLI paradigm. Ownership advantages comprises of mainly intangible assets and exclusive of the firm such as trademarks, patents, monopoly powers, enjoyment of large economies of scale, information and technology among others. Such O-advantages result in a reduced cost of production for the firm which enable it to compete with other firms in a foreign nation. Generally, the net ownership benefits represent the firm's strengths and capabilities in the foreign market (Ndolo, 2017).

Location advantage is concerned with the suitable place of investing, that is, where a firm should invest out of its domestic country. This encompasses the host country-specific characteristics that

encourage investment in that country by other firms from outside. These include economic factors such as access to local and foreign markets, transport and communication costs, investment incentives, policy issues like tariff barriers and tax regimes, among others (Nyaga, 2013). Lastly, as described by Makoni (2015), it should be more beneficial for the firm in possession of the ownership merits to utilize them for itself (internalization advantage) rather than transferring the ownership to foreign firms via licensing or contracting (externalization). In line with the the above key parameters, a firm will desist from open market transactions or direct investments if the investment costs associated are more favourable internally than externally. The theory doesn't account for the effect of the change in any macroeconomic variable on investment.

Empirical Review

Effect of Change in Interest Rate on Aggregate Private Investment

Brian (2018) determined the effect of interest rate on the growth of real estate markets in Kenya between 2007 and 2017. The study used secondary data including the mortgage interest rates and real estate growth as expressed by the montage value of commercial banks offering mortgages and KNBS in Kenya. Data was collected on quarterly basis over the study period. OLS regression technique was employed and the study findings showed a negative and significant effect of mortgage interest rate volatility on real estate growth in Kenya.

Shukrani (2020) ascertained the effect of macroeconomic variables volatility on financial performance of commercial banks listed at the Nairobi securities exchange (NSE) from 2009 to 2018. The study used secondary data including commercial banks' financial performance and interest rate that were measured by return on asset and commercial banks' lending rate respectively. OLS regression technique was used. The regression analysis results manifested an insignificant positive relationship between interest rate and commercial banks' financial performance over the study period.

Effect of Change Inflation Rate on Aggregate Private Investment

Abdulahi (2017) explored the real exchange and inflation rates impact on private investment in Uganda. The study used secondary data sourced from the World Bank covering the period between 1990 and 2014. OLS regression technique was employed and the regression analysis results showed a negative and insignificant effect of inflation on private investment in Uganda under the period of study.

Omondi (2022) determined the effect of selected macroeconomic volatility on financial performance of the real estate sector in Kenya between 2012 and 2021. The study applied secondary data including the Kenya's real estate sector performance and inflation statistics sourced from the Hass Consult and the Kenya National Bureau of Statistics (KNBS) on quarterly basis. The study employed the OLS regression technique. The regression analysis results arrayed a significant and positive effect of inflation rate volatility on real estate sector performance in Kenya in the study period.

Effect of Change in Exchange Rate on Aggregate Private Investment

Wanguru (2019) evaluated the effect of foreign exchange rates volatility on financial performance of agricultural sector in Kenya from 2009 to 2018. The study applied secondary quarterly data on

agricultural sector financial performance and exchange rate obtained from Kenya National Bureau of Statistics (KNBS) and Capital Market Authority (CMA). The study employed the OLS regression technique. The regression findings showed a positive and significant effect of exchange rate volatility on agricultural sector financial performance in Kenya over the study period.

Udeh & Emmanuel (2020) analyzed the impact of exchange rate fluctuations on domestic investment in Nigeria. The study used secondary quarterly time series data that included domestic investment and exchange rate for the period between 1986 and 2017. Moreover, the study employed the ARDL technique that incorporated both the short and long-run dynamics of all variables. The findings, both the short-run and long-run, revealed that exchange rate fluctuations imposed a negative and insignificant effect on domestic investment in Nigeria in the course of the study period.

Research Gaps

Previous studies done on macroeconomic volatility and private sector investments in Kenya, including (Majok, 2015; Brian, 2018; Wanguru, 2019; Mmeri, 2020; Omondi, 2022) are limited and specific. They majorly focused on a particular macroeconomic volatile variable like exchange rate volatility and a specific form of private sector investment such as commercial banks, real estate sector, stock market and agricultural sector and not on aggregate private investment in Kenya. Furthermore, they mostly relied on the OLS regression technique in their analyses. The study therefore wished to fill the gaps by determining the effect of change in macroeconomic variables on aggregate private investment growth in Kenya via the ARDL method. The change in macroeconomic variables was operationalized as the change in interest rate, change in inflation rate and change in exchange rate.

METHODOLOGY

Analytical Framework

The study embraced the concept of the flexible accelerator theory of investment which postulates the existence of a direct relationship between investment *(I)* and changes in output/income *(Y)*. In that note, the equation representing the net investment being positively related to the change in output at time period *t* was stated as indicated below.

$$I_t = \beta(Y_t - Y_{t-1}) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (1)$$

But $Y_t - Y_{t-1} = \Delta Y_t$

Hence, equation *(1)* can also be rewritten as;

$$I_t = \beta \Delta Y_t \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (2)$$

Since capital depreciates over time, then, gross investment function is obtained by including the depreciation component (similar to replacement investment taken by firms to offset the rate of capital depreciation) in the above equation *(2)*.

$$I_t + R_t = \beta \Delta Y_t + R_t \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3)$$

Now with the assumption of no depreciation of capital by the theory, then, gross and net investment are equal since $R_t = 0$. Furthermore, in order to deem for the sluggish adjustment of capital stock

to the desired stock of capital, we factor in the lags to both the dependent and independent variables resulting to the following gross investment function.

$$I_t = \alpha I_{t-1} + \beta_1 \Delta Y_t + \beta_2 \Delta Y_{t-1} + \mathcal{E}_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where I_t is private sector gross investment, I_{t-1} is lagged private sector gross investment, ΔY_{t-1} is lagged change in output, α, β_i are the coefficients of respective lagged variables and $\mathcal{E}_t$ is the error term.

Since the flexible accelerator theory gives room for other factors affecting private sectors' investments, another variable is introduced in the above equation (**4**) to account for the other factors influencing aggregate private sector investment decisions.

$$I_t = \alpha I_{t-1} + \beta_1 \Delta Y_t + \beta_2 \Delta Y_{t-1} + Z_t + \mathcal{E}_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where Z_t represents all other factors affecting private sector investments including change in interest rate, change inflation rate and change in exchange rate.

3.1 Model Specification

The above equation (**5**) was further augmented by including the variables of interest namely; change in interest rate, change in inflation rate and change in exchange rate as per the study objectives. Incorporating such variables to the specification led to the general functional form of the model as indicated below;

$$I = f(\Delta X_1, \Delta X_2, \Delta X_3) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where I is aggregate private investment, ΔX_1 is the change in interest rate, ΔX_2 is the change in inflation rate and ΔX_3 is the change in exchange rate.

However, the study employed the autoregressive distributed lag (ARDL) model in determining the effect of change in macroeconomic variables on aggregate private investment in Kenya. Thus, the ARDL model was specified as indicated below.

$$\begin{aligned} I_t = \beta_0 + \alpha I_{t-1} + \beta_1 \Delta X_{1t-1} + \beta_2 \Delta X_{1t-2} + \beta_3 \Delta X_{1t-3} +, \ldots, + \beta_i \Delta X_{1t-k} +, \ldots, + \Theta_1 \Delta X_{2t-1} \\ + \Theta_2 \Delta X_{2t-2} + \Theta_3 \Delta X_{2t-3} +, \ldots, + \Theta_i \Delta X_{2t-k} +, \ldots, + \Phi_1 \Delta X_{3t-1} + \Phi_2 \Delta X_{3t-2} \\ + \Phi_3 \Delta X_{3t-3} +, \ldots, + \Phi_i \Delta X_{3t-k} + \mathcal{E}_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7) \end{aligned}$$

Where I_t is aggregate private investment at time t, I_{t-1} is lagged aggregate private investment, β_0 is the constant, α is the coefficient of lagged aggregate private investment, $\beta_i's, \Theta_i's, \Phi_i's$ are the coefficients of respective lagged independent variables, $\mathcal{E}_t$ is the error term, k is the maximum lag length while $i = 1, 2, 3, \ldots, k$

Hence, the above ARDL model was summarized as;

$$I_t = \beta_0 + \alpha I_{t-1} + \sum_{i=1}^{k} \beta_i \Delta X_{1t-i} + \sum_{i=1}^{k} \Theta_i \Delta X_{2t-i} + \sum_{i=1}^{k} \Phi_i \Delta X_{3t-i} + \mathcal{E}_t \ldots\ldots\ldots\ldots\ldots (8)$$

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ESTIMATION RESULTS AND ANALYSIS

Stationarity Test

Unit root test was carried out on each of the study's variables at level using the ADF test and results presented in Table 1 below. Aggregate private investment, change in interest rate and change in exchange rate were not stationary at level. They became stationary at first order differencing. Change in inflation rate was stationary at level.

Table 1: Stationarity Test Results

Variable	At Level		1st Order Differencing		Order of Integration
	Dickey Fuller	P-Value	Dickey Fuller	P-Value	
Aggregate Private Investment	-2.106	0.5318	-4.8796	0.01	I (1)
Change in Interest Rate	-2.3579	0.4305	-4.6355	0.01	I (1)
Change in Inflation Rate	-4.5393	0.01	-	-	I (0)
Change in Exchange Rate	-3.0482	0.1528	-4.4528	0.01	I (1)

Cointegration Analysis

Existence of long-run relationship(s) was tested through the Johansen test. Both the Johansen's Maximum-eigenvalue and Trace tests indicated the absence of cointegration equation(s) since the test statistic values were less than the critical values at $\alpha = 0.05$. This implies that the variables were not cointegrated.

Maximum Lag Length Selection

Maximum lag length was determined using the Akaike Information Criterion (AIC), Hannan Quinn (HQ), Schwarz Criterion (SC) and final prediction error (FPE). The criteria indicated a maximum lag length of 8.

Final ARDL Model

The best ARDL model was chosen by comparing the AIC, BIC and Log Likelihood function values of the eight models. Therefore, model number eight was the best model since it had the smallest AIC, BIC and Log.Lik as presented in Table 2 below.

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Table 2: Best ARDL Model

Predictors	Dependent variable			
	Estimates	**std. Error**	**Statistic**	**p**
(Intercept)	7.01	3.19	2.19	**0.042**
Lag 1 Capital Formation	0.61	0.18	3.36	**0.004**
Lag 1 Change in Interest Rate	0.02	0.15	0.13	0.900
Lag 2 Change in Interest Rate	-0.05	0.15	-0.32	0.751
Lag 3 Change in Interest Rate	-0.32	0.14	-2.22	**0.040**
Lag 4 Change in Interest Rate	-0.02	0.14	-0.17	0.869
Lag 5 Change in Interest Rate	0.29	0.15	1.85	0.081
Lag 6 Change in Interest Rate	-0.12	0.15	-0.76	0.460
Lag 7 Change in Interest Rate	-0.06	0.15	-0.41	0.690
Lag 8 Change in Interest Rate	0.01	0.15	0.09	0.932
Lag 1 Change in Inflation Rate	0.04	0.05	0.70	0.495
Lag 2 Change in Inflation Rate	0.07	0.06	1.21	0.243
Lag 3 Change in Inflation Rate	0.05	0.06	0.82	0.424
Lag 4 Change in Inflation Rate	0.06	0.07	0.86	0.402
Lag 5 Change in Inflation Rate	-0.09	0.06	-1.36	0.192
Lag 6 Change in Inflation Rate	0.03	0.06	0.43	0.673
Lag 7 Change in Inflation Rate	0.03	0.05	0.72	0.480
Lag 8 Change in Inflation Rate	0.11	0.04	3.08	**0.007**
Lag 1 Change in Exchange Rate	-0.02	0.08	-0.22	0.830
Lag 2 Change in Exchange Rate	0.03	0.06	0.53	0.603
Lag 3 Change in Exchange Rate	-0.01	0.08	-0.11	0.912
Lag 4 Change in Exchange Rate	0.07	0.09	0.80	0.436
Lag 5 Change in Exchange Rate	-0.07	0.09	-0.88	0.393
Lag 6 Change in Exchange Rate	-0.03	0.07	-0.42	0.679
Lag 7 Change in Exchange Rate	-0.07	0.07	-1.03	0.317
Lag 8 Change in Exchange Rate	-0.13	0.08	-1.62	0.123
Trendvar	0.03	0.03	1.06	0.305
Observations	44			
R^2 / R^2 adjusted	0.834 / 0.580			
AIC	156.720			

Diagnostic Checks for the Best ARDL Model

Diagnostic tests like test for autocorrelation, normality test for the residuals and constant variance test were done on the best and final ARDL model with results showing no serial correlation, residuals being normally distributed and presence of homoskedasticity. This was true since the p-values of all the tests were greater than the five percent significant level (0.05).

Table 3: Diagnostic Checks Results

Diagnostic Test	Statistical Method	P-Value	Remark
Autocorrelation	Breusch-Godfrey LM Test	0.1770	No Serial Correlation
Normality	Jarque-Bera Test	0.7023	Normal Distribution
Heteroskedasticity	Breusch-Pagan Test	0.9251	Homoskedasticity Present

Model Discussion

The above ARDL model can be stated as indicated below.

$$I_t = 7.01 + 0.61 I_{t-1} - 0.32 \Delta IR_{t-3} + 0.29 \Delta IR_{t-5} + 0.11 \Delta FR_{t-8} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (9)$$

Where I_t represents Aggregate Private Investment at time t, I_{t-1} is Aggregate Private Investment at time t-1, ΔIR_{t-3} represents Change in Interest Rate at time t-3, ΔIR_{t-5} is Change in Interest Rate at time t-5 and ΔFR_{t-8} represents Change in Inflation Rate at time t-8.

Effect of Change in Interest Rate on Aggregate Private Investment

Change in interest rate imposed a significant effect on aggregate private investment growth in Kenya over the study period. The effect was negative at $\propto = 0.05$ while positive at $\propto = 0.1$. The statistically significant negative effect implies that an increase in the rate of change in interest rate results into a decrease in aggregate private investment. Furthermore, such effect was not instant but translated on aggregate private investment after a period of three years. Such findings were in agreement with those obtained by Brian (2018) who found negative and significant effects of mortgage interest rate volatility on real estate growth in Kenya. Similarly, by Mburu (2020) who got significant negative effects of interest rate volatility on stock market returns in Kenya, both using the OLS regression technique. The findings were in contradiction to those obtained by Shukrani (2020) who found insignificant positive effects of interest rate volatility on commercial banks' financial performance at the NSE.

Effect of Change in Inflation Rate on Aggregate Private Investment

The ARDL findings further indicated a significant effect of change in inflation rate on aggregate private investment growth in Kenya. The effect was positive at $\propto = 0.05$. Statistically significant positive effect portrays that an increase in the rate of change in inflation rate leads to an increase in growth of aggregate private investment. Such aforementioned effect was not only transferred to aggregate private investment instantly but after a period of eight years. These findings were in consistent with those obtained by Omondi (2022) who found significant and positive effects of inflation rate volatility on real estate sector performance in Kenya by the OLS technique. The results contradicted those obtained by Mmeri (2020) who got significant negative effects of inflation uncertainty on private investment in Kenya.

Effect of Change in Interest Rate on Aggregate Private Investment

Finally, the ARDL results indicated that change in exchange rate had no any significant effect on aggregate private investment growth over the study period in Kenya. The results were similar to those of Udeh & Emmanuel (2020) who found negative and insignificant effects of exchange rate fluctuations on domestic investment and Chowdhury & Wheeler (2015) who did not find any significant impact of exchange rate volatility on fixed private investment. The findings were in contradiction to those of Majok (2015) who obtained positive and significant effects of foreign

exchange rate fluctuations on financial performance of commercial banks in Kenya. Wanguru (2019) also obtained a positive relationship between exchange rate volatility and agricultural sector financial performance in Kenya.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Effect of Change in Interest Rate on Aggregate Private Investment

The ARDL findings indicated that there was a significant effect of change in interest rate on aggregate private investment in Kenya since the P-value was less than the significance level at 95 percent confidence interval, that is, $0.040 < 0.050$. The effect was negative and manifested on the growth of aggregate private investment after three years. Such outcome was consistent with the Flexible Accelerator theory in terms of the delay concept and in support of the fact that higher levels of change in interest rate decreases individual consumption and economic activities in the economy which in turn decreases aggregate investment (Keynes , 1936). Furthermore, higher rate of interest reduces the private sector's demand for credit besides diminishing its anticipated return on investment thus discouraging aggregate investment (Kinyanjui, 2024).

Effect of Change in Inflation Rate on Aggregate Private Investment

The ARDL results also showed the existence of a statistically significant effect of change in inflation rate on aggregate private investment in Kenya. This was true because the P-value was less than the five percent significance level, that is, $0.007 < 0.050$. The effect was positive and translated to the growth of aggregate private investment after eight years. These results were fully in support of the Flexible Accelerator theory. According to Idolor & Raphael (2022), moderate inflation signals macroeconomic stability which inturn creates a conducive environment for investment. Similarly, the Keynesian economics recognizes some level of inflation being beneficial for economic stability and thus favours aggregate investment. The significant positive impact of change in inflation rate on aggregate private investment therefore implied that inflation was changing more favourably over the study period in Kenya.

Effect of Change in Exchange Rate on Aggregate Private Investment

Change in exchange rate did not have any significant effect on the growth of aggregate private investment in Kenya. This was due to having P-values that were greater than the five percent significance level. The insignificant effect of change in exchange rate was as a result of the fact that a bigger percentage of private sector investments in Kenya are focused towards the domestic market. This implies that changes in the exchange rate might not significantly affect the growth and performance of local firms.

Recommendations

In reference to the research results obtained, the study therefore recommends the following;

The government through the Central Bank of Kenya should enforce the inflation targeting policy. The government should maintain inflation within the required target range of 5 ± 2.5 percent as preceded under the "Monetary Policy". This will enable the country to operate under a favourable and moderate inflation in most if not all the times. It will further ensure a sustained macroeconomic

stability in the economy, making the environment conducive for investment at all times thus, boosting aggregate private investment growth within the country.

The government through the Central Bank of Kenya should maintain interest rate stability by ensuring the adherence of low, stable and liquid commercial banks' lending rates. This will encourage more borrowing by individual investors and firms at an affordable rate hence, enhancing aggregate private investment growth in Kenya.

The government generally should preserve macroeconomic stability over the years by ensuring that macroeconomic variables remain largely stable in the country. This will boost investors' confidence and provide a reliable environment for investment in Kenya.

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