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## Money Supply, Inflation Rate, Exchange Rate and Growth of Domestic Private Investment in Kenya

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### Abstract

The objective of the study was to evaluate the effect of selected macroeconomic variables on the growth of the domestic private investment. The study used a time series quarterly data spanning 1997 to 2018. Autoregressive Distributed Lag (ARDL) model was adopted to examine if changes in select macroeconomic variables determine the growth of domestic private investment in Kenya. These selected macroeconomic variables are; central bank rate, the repo rate, t-bill rate, money supply, exchange rate, and inflation. The bound cointegration testing procedure revealed the existence of a long-run cointegration. The long-run cointegrating model estimated shows that private domestic investment varies significantly and negatively with the central bank rate and the commercial lending rate as well. However, an increase in the money supply increases the level of investment. Another significant observation is that moderate inflation is critical in increasing the level of investment. These results point to one critical revelation; monetary policy conduct is essential in driving private domestic investment. An error correction model shows that 62% of deviation from the cointegration path is corrected with a quarter.

**Keywords:** ARDL; private domestic investment; Macroeconomic variables; error correction.

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## **1. Introduction**

Investment is one of the very important macroeconomic variables since the capacity of an economy depends not only on labor but also on the capacity available to produce goods and services [1]. This is in line with Author [2] argument that the rate of growth of an economy is proportional to the rate of investment. With increasing burdens on public finances, a higher investment ratio would need to come almost totally from the private investment [3]. The private sector plays a major role in the overall macro-economic development of any country, in the current development strategy private investment is acknowledged as a major source of promoting income and employment through enlarged production and productivity [4]. Author [5] enhancing domestic investment indicates more domestic capital formation in the economy, which is quite healthy to economic performance since it moderates productive resources/ capital leakages. Governments of developing countries, Kenya inclusive are now considering the potential of private sector involvement in their economies and more in terms of private investment, despite these efforts private investment has remained low in most developing countries [2]. Developing countries largely in Sub-Saharan Africa have heavily relied upon private investment as a way of solving economic challenges. Through private investment, the economies experience an increase in job opportunities, increased foreign investment, and enhanced technology growth [6]. To increase private investment, many governments in SSA have come up with development strategies among them, African Development Bank (ADB) to offer finance to the private sector. Additionally, governments in these countries have gone ahead, and privatized government-owned parastatals and created the private sector's institution [6]. The Kenyan government has put up several measures to ensure adequate private investment growth. This includes relying more on external concessional debt rather than domestic debt to avoid crowding out private investment [7]. However, even with government efforts to increase private investment, it has remained lower in Kenya than anticipated [8]. Private sector investment is the number one catalyst for economic growth whereas the public sector is tasked with providing a conducive environment [9]. This is because private investment forms an important portion of the Gross Domestic Product (GDP). If investment grows, GDP also grows [10]. To be able to stimulate and sustain economic growth, it is paramount that developing countries have a private investment as a significant portion of GDP [11]. Author [12] private investment as a portion of GDP should not be less than 15 at any given time, whereas the target percentage of private investment should be at least 25% of GDP. With a stated government policy objective of achieving an average economic growth rate of 10 percent per annum, investment levels should be above 32 percent of the GDP with public investment being above 9 percent of the GDP and private investment being above 24 percent of the GDP [7]. Globally, China has experienced rapid economic growth and managed in thirty years to move its economy from underdevelopment and excessive poverty to an established global economy while attracting the attention of several developing countries among them South Africa [13]. China's economic growth has been phenomenal with an annual average of 9.9% from the year 1979. The highlight of China's economic growth was in 2010 with a GDP growth of 10.5%, which was equivalent to a third of the world growth. Enhanced domestic investment has been at the heart of China's growth for the last 30 years. The focus of China's approach has been more commodity than consumption driven with financing coming from significant amounts of domestic savings as well as foreign investment [14]. Other stimulating factors include economic reforms, reduction in external demand, trade openness as well as enhanced public investment [15]. Domestic investment between 1984 and 2010 averaged

39.8% in comparison to 20.5% for African countries over the same duration [13].

## **2. Literature and Hypothesis Development**

Proponents of the saving theory argue that investments are the equivalent of saving. The conventional belief is that interest rates help achieve equality within these economies [16]. Where savings exceed the investment level, interest rates decrease to discourage savings while encouraging investment with the reverse being true. Change in interest rate will cause a change in saving which will then lead to a change in investment. Keynes however disagrees that the balance between saving and investment is brought about by rate of interest; instead, Keynes argues that it is because of changes in income levels that bring about saving and investment balance [16]. Author [17] in his study evaluating the impact of saving on economic growth held that that savings create the capital formation. Additionally, savings also bring about technological innovation as well as enhancing progress that leads to economies of scale while enhancing specialization leading to increased production thus GDP growth. Consequently, savings lead to better utilization of scarce resources efficiently, enhance the level of domestic product output, income levels, and employment and a result offering a solution to economic challenges such as inflation, unemployment, and balance of payment deficit. The endogenous growth theory points out that economic growth rate is dependent on the rate of return while inflation leads to a decline in the rate of return hence reduction in capital accumulation that in turn slows down the growth rate. Additionally, inflation brings about uncertainty in the financial market thus growing the investment risk that also results in reduced investment [18]. Financial markets will significantly suffer from the negative effects of inflation but only to a certain level and after which inflation has no significant effect on the financial markets. Inflation can increase to a certain range whereby, the financial markets are extensively damaged such that beyond the inflation level, there can be no more consequences on economic growth or the financial sector performance [19]. There is a positive link between financial market development and the level of investment [20]. The negative effects of inflation similarly harm the investment level [21]. Reduction in investment levels is also attributed to low confidence levels brought about by inflation. Additionally, long term financing for capital formation is also negatively affected by inflation. Tobin q theory Tobin (1969), examines investment as the relationship between the market value of capital and the cost of acquiring the capital. The backbone of this theory is defined as the ratio of the market value of capital to the replacement cost of capital. Advances in the literature, notably Abel (1983), have shown that marginal q, which is defined as the ratio of the market value of a marginal unit of capital to its replacement cost, is a more relevant measure than average q in the investment analysis. Yet, marginal q is considered more difficult to measure than average q, which leads to problems in any empirical investigation. Hayashi (1982), however, has shown that there are cases where marginal q and average q are proportional such as when the operating profit function and the augmented adjustment cost function are of the same degree of homogeneity. Using both neoclassical and Tobin Q theories, Author [22] show that the determinants of private investment can be modeled as; expected return, interest rate, cost of capital stock, inflation, exchange rate, change of output, capital availability, income tax and market price of capital stock. Lastly, the neoclassical flexible accelerator theory is the widely accepted general theory of investment behavior and empirical tests of the model using data from several industrial countries have been quite successful [10]. The basic assumption of the flexible accelerator principle is that investment is a function of the level of output and the user cost of capital. The user cost of capital is, however, dependent on the price of capital goods, the real

interest rate, and the rate of depreciation of capital assets. This theory also links monetary and fiscal policy adjustment to investment. Author [23] explains that if expansionary fiscal policy (high government spending and low personal tax policy) is combined with a tax policy such as a greater investment tax credit will promote private investment. Secondly, the expansionary fiscal policy raises the level of income and expected output of the firms and will, therefore, raise the level of desired capital stock and hence stimulate investment. On the other hand, expansionary monetary policy lowers interest rate which would reduce the rental cost of capital and will increase the desired capital stock [24]. The monetary policy conduct and transmission mechanism link long term and short term interest rates to investment behavior. From an empirical perspective, Author [2] considered the impact of Inflation on Private Investment in Rwanda, in the period (1995-2009) by methods for econometric examination dependent on the co-joining and Error Correction Model (ECM). The investigation discoveries bolstered the presence of a short-run dynamic modification and the long-run equilibrium relationship among these macroeconomic variables and private investment levels. The outcomes uncovered that total national output development influences private investment and both over the long haul and short-run. The impact of genuine interest rates on private investment is featured in this investigation especially in the short-run model. Finally, a positive effect of the inflation rate on private investment is affirmed by the observational outcomes in the investigation. Accordingly, the experimental proof gave recommendations that there would be an expansion in the level of private investment when the private sector is crushed for credit. Author [22] investigated the determinants of private investment and the consequences of economic development in Indonesia for the period 1990 to 2011. By utilization of various relapse techniques and board information to decide the impact of government investment, inflation rate, credit to private investment, and exchange rate on private investment. The examination uncovered that interest rates negatively affect private investment. Interest rate decides investment in genuine sector movement where if interest rates rise, the investment will drop. Then again, if interest rates dropped, it will cause an investment request to be expanded. The examination additionally settled a constructive outcome of open-investment on private investment action. This implies the greater the legislature the more stout investments accessible offices and framework required by the private sector to attempt gainful exercises, including investments. The rate of inflation was found to negatively affect private investment. Inflation will cause interest rates to wind up high, both store and credit interest rates. High rates of interest rate will motivate the financing cost to end up more costly in this manner affects the genuine sector. High-interest rates likewise would cripple investors or firms to utilize financing from the banking sector since the surprising expense of capital makes higher interest cost and investors will tend to hold their interest in investing in the genuine sector. Mostly for investors who require financing relies upon the banking sector. These conditions make private investment start to decay and diminish. The examination showed that the heading of the exchange rate positively affects private investment. The bearing of impact is certain, suggesting that an expansion in the exchange rate (depreciation) may prompt an increment in private investment. Similarly, abatement in the exchange rate (appreciation) may cause a decrease in private investment. Author [4] analyzed what determines new levels of domestic private investments in Kenya. The study used data covering the period 1970-2010, the study adopted a neoclassical flexible accelerator model formulated by Jorgensen (1971). The objectives of the study were to analyze the factors that influence domestic private investments in Kenya, estimate the impact of these factors on domestic private investments, and to draw conclusions and prescribe policy recommendations. The study revealed that the real exchange rate has a positive and significant effect on private investment,

inflation; foreign exchange reserves have a negative and insignificant impact on private investments. The study concluded that macroeconomic stability is an integral part of any investment activity in a country as it provides a more reliable economic environment that enables investors to take advantage of profitable opportunities. High inflation rates negatively affect profits. High national debt reduces a country's credibility to borrow. Huge debts could be a prelude to more heavy future taxes. Proper utilization of borrowed funds is necessary to spur new investments. Volatile exchange rates render international trade unpredictable, which will lead to the enhancement of investor confidence. Author [25] evaluated Monetary Policy Effect on Private Sector Investment with evidence from Sierra Leone. The authors used the money supply as one of the variables affecting private sector investment. The study adopted the ordinary least squares (OLS) regression model. OLS is a widely used estimation technique in econometric analysis and according to the Gauss-Markov theorem; OLS regression estimates are the Best Linear Unbiased Estimates (BLUE) upon satisfaction of specific criteria. In the regression process, the time-series properties of the variable are examined. The methodology, therefore, involved estimating an econometric model where the impact of monetary policy on private sector investment in Sierra Leone is investigated. Using recent econometric techniques, the results suggested that money supply exerts a positive and statistically significant effect on private sector investments. Author [26] investigated the short-run and the long-run impact of financial development and economic growth on private investment and examined whether the measurement of financial development matters for private investment, in Ghana over the period 1970–2014. The study used private sector credit to GDP, deposit money banks to GDP, broad money supply to GDP, financial system deposit to GDP, and an index constructed by principal component analysis as indicators of financial development. The findings indicated that the impact of financial development on private investment is susceptible to the type of financial development indicator that was utilized, in the short run but not in the end. For instance, in the short run, the index of all financial development indicators and broad money supply had an important effect on private investment. In the end, the indicators of financial development: broad money supply to GDP, deposit money banks' assets to GDP, the financial system deposits, and private sector credit showed no significant impact on private investment. The findings serve as a warning to policy and decision-makers concerning the use of financial development measures and indicators as policy instruments in investment policies implementation and design. As examined by Author [27], the Long-Run Relationship between Monetary Policy and Private Investment in Nigeria and evaluated the impact of money supply among other variables on private investment. The data used in this study were obtained from different sources but covered the period 1981-2009. The explanatory variable for the study was Private Investment (PI), which is obtained from the Statistical Bulletin of the Central Bank of Nigeria. Author [23] studied the impact of monetary policy on private sector investment in Kenya where the authors included cash supply as an explanatory variable to model the impact of monetary policy on the private sector. Quarterly macroeconomic data that was obtained over the period 1996 to 2009 was used in the study and the philosophy drew upon Cointegration tests and unit-roots utilizing a vector error correction model. The study showed that cash supply had a positive association with private sector investment, which was reliable with the IS-LM model embraced. Author [28] researched the effect of interest rates on private investment in Ghana for the period 1970-2015. The authors utilized the ARDL estimation systems and the ADF test in the study. The long-run outcomes demonstrated that interest rate emphatically affected private investment. The short-run outcomes likewise uncovered that past estimations of private investment affected current investment however emphatically and

negatively too. The interest rate was found to apply the negative effect for present and multiyear esteems while lag one demonstrated positive effect. The outcomes recommended that the interest rate must have the capacity to energize higher private investment. This should be possible by expanding the genuine interest rate on private reserve funds or family unit funds with the goal that a bigger measure of salary would be spared to amass more capital and henceforth private investment. By this, the higher genuine interest rate would build private funds which would likewise expand capital aggregation and henceforth private investment. [29] Investigated the relationship between Domestic Private Investment (DPI) AND Interest rate in Nigeria. The study aimed to examine the impact of interest rates and Private Domestic Investment in Nigeria from 1980 through to 2015. OLS Regression was adopted to determine the relationship between the variables employed in the study. Gross Domestic Product served as the response variable while the Real Interest Rates and Prime Lending Rates were the response variables. The findings showed that the Real and Prime Lending Rates are negatively related to Private Domestic Investment and statistically significant at 5%. The coefficient of determination showed that only 23% of the variation in DPI is explained by interest rates. This shows that the model has low predictive power. The study concluded that the success of promoting the Private Domestic Investment does not depend only on interest rates though it should not be ignored. Based on these findings, the study recommended that monetary authorities should promote policies to improve deposits and make available loanable funds as this plays a vital role in promoting DPI in Nigeria Author [30] studied the determinants of domestic private investment in Nigeria. This investigation experimentally inspects the example of household investment amid the period under consideration. The investigation was done for the period between 1970 and 2010. Being a time series data, to evade relapse results in a test for the stationarity of the information, the Philip-Peron unit root test was utilized. At that point, Johansen's (1988) method was utilized to build up if the non-stationary variables are cointegrated. OLS regression was used method to explore the relationship between gross domestic investments. The estimated coefficient of GDP to private investment was positive and significant. This supported the hypothesis of Author [37] bthat the increase in GDP due to an increase in FDI could produce an accelerator effect on domestic investment. Thus, a one-unit increase in GDP will bring about a 22% increase in domestic investment. The investigation suggested an adjustment in the goals and objectives of private sector cooperation by expanding local credit to this sector and to create a suitable working environment using the arrangement and provision of security and infrastructural facilities. Author [31] studied the relationship between economic growth and private investment in Sub-Saharan Africa. In the study, the panel data used was collected over the period 1991–2004. This was data from 18 African countries. The study concluded that a negative relationship existed between private investment and interest rates. This signals how large interest rate for investment is growing among African economies. The study also establishes that turnover ratio and credit to the private sector have significant relationships with private investment. However, the turnover ratio was found to be insignificant in predicting Private investment. The informal sector is still extensive and positively affects private investment and institutional variables assume a key role in deciding the private investment level in Africa. Author [32] conducted a study intending to examine the factors that affect private investment in Sri Lanka. The study was based on secondary data that covered the period 1975 to 2015. Private investment was the dependent variable and inflation rate, real exchange rate, real GDP growth, foreign investment, foreign trade, budget deficit as the response variable, and dummy variable to represent linearization. To test the basic hypotheses that were construed for the study, an econometric model was used. To determine the existence or non-existence of the

relationship between the variables and to determine if the relationship was linear or non-linear the study adopted the least-squares method (OLS). Findings that were derived from the regression model and correlation coefficients of the study revealed that real GDP growth, inflation rate, real exchange rate, foreign trade, budget deficit, foreign direct investment, and liberalization factors are positively associated with private investments. It was further identified that out of the response variables foreign direct investment bears more effects to private investments in Sri Lanka whereas the liberalization least affects private investments. The relationship between liberalization factor and private investments denotes the less importance of the export and import industry in determining private investment in Sri Lanka. The study concluded that emphasis should be on policies related to foreign direct investment, real exchange rate, and foreign trade since they play a significant or relevant impact in predicting private investment. In a study of determinants of private investments Kenya, Author [4] used regression analysis and co-integration techniques to establish the long run and short-run private investment model. Study objectives were to analyze the factors that determine domestic private investments in Kenya, estimate the impact of these factors on domestic private investments, and to draw conclusions and prescribe policy recommendations. The study used data covering the period 1970-2010. The estimated coefficients for savings, lending rates, and foreign aid concurred with theoretical expectation of positive influence on private investment. The study suggests policies such as increasing the allocation of public funds for capital accumulation. Since real lending rates have a negative influence, it is important to reduce the cost of credit through monetary policies. Utilizing financial investigation and time-series information collected over the period 1970 to 2012, Author [32] thinks about broke down the determinants of private investment in Nigeria. The investigation utilized the Error-Correction modeling strategy, which limits the probability of approximating fake relations, while in the meantime holding long-run data. The consequences of the examination demonstrated that the investment rate was decidedly connected with both the development rate of discretionary cash flow and the genuine interest rate on bank stores. The examination confirmed that investment moderated in Nigeria because of expanded loaning rate, diminished open use, decreased funds, political unsteadiness, and deficient foundation. The examination prescribed among other things thoughtfulness regarding development policy in Nigeria ought to be to expand the gainful base of the economy with the end goal to significantly reduce unemployment and to positively impact real income growth. Author [33] also conducted a study on macro-economic determinants of DPI drawing evidence from East Africa. The panel data set used was for the period between 2000 and 2012. The data was obtained from African development indicators (ADI), World Bank, International Monetary Fund (IMF), United Nations Conference on Trade and Development (UNCTAD) and other complementary sources. The research utilized Hausman (1978) test specification either FE or random effect model based on the given data, and it aided in finding the parameters to be estimated in the model. Different parameters were found to significantly affect the domestic private investment within the study period. Proof from econometric yield affirmed that local private investment is strongly and emphatically related to GDP growth rates. In like manner, credit to the private sector has fortified the development of household private investment in the East African region. Moreover, human capital development utilizing elementary school enlistment affirmed that it significantly affects the development of local private investment in the region. Author [31] conducted study research to examine factors that affect private investments in Sri Lanka. In the study secondary data covering the period from 1975 to 2015 was used. The regression model and correlation coefficients of the study revealed that real GDP growth, inflation rate, real exchange rate, budget deficit, foreign

trade, foreign direct investment, and liberalization factor are positively associated with private investments. Further, it identified that out of all the response variables, foreign direct investment is the most affecting factor to private investments in Sri Lanka whereas the liberalization factor is the least affecting factor. The relationship between liberalization factor and private investments denotes the less importance of the export and import industry in determining private investments in Sri Lanka. Therefore, in conclusion, this study emphasizes that foreign direct investment, real exchange rate, and foreign trade play significant or relevant impacts as factors in determining private investments. Author [34] carried out a research study to examine the impact of exchange rate fluctuations on domestic private investment (DPI) performance in Nigeria. Descriptive statistics and econometric methods were employed. Thus, simple averages of descriptive statistics and Error Correction Model (ECM) technique within the Ordinary Least Square estimation were employed to analyze the various trends in the data. Wide variations in the variables were depicted by the Std. Dev. of the exchange rate variable that was unusually high as depicted by the descriptive statistics from the study. The exchange rate during the period under investigation, therefore, had a high degree of volatility. It was found that the depreciation of the interest rate and currency does not stimulate private domestic investment (PDI) in Nigeria. The study thus recommended that monetary authorities should adopt an appropriate policy in appreciating the value of the naira as devaluation has been a mistake since 1986, reduce borrowing and lending charges to boost the performance of private domestic investment through a stable macroeconomic environment. Author [35] used the ARDL approach to examine macroeconomics determinants of private investment in Nigeria Adopting a causal approach, the research is based on annual time series data from 1979 to 2012. The research uses data derived from the 2012 edition and Central Bank of Nigeria (CBN) Annual Reports, Central Bank of Nigeria (CBN) Statistical Bulletin 2009, Similar Issues. The macro-economic variables explored by Kolade (2014) included Real Exchange Rate, Inflation Rate, and Aggregate Demand Condition in the economy (GDP), Credit to Private Sector and Real Interest Rate. From the study findings, the researcher concluded that Real Exchange Rate, Inflation Rate, Aggregate Demand Condition in the economy (GDP), Credit to Private Sector and Real Interest Rates have not been able to contribute significantly to improve private domestic investment in Nigeria. For these factors to work according to the research, the government must intervene and improve the economic environment to attract private investment. Author [36] researched to examine the effect of exchange rate fluctuations on GDP in Kenya over the period 2008-2012. The study aimed at assessing the effect of exchange rate fluctuation on Gross Domestic Product in Kenya. OLS regression was conducted to assess the impact of the exchange rate fluctuations on the GDP of the country. The study findings concluded that exchange rate fluctuations have significant negative effects on GDP growth of the country, as it raised inflation, reduced the growth of real income and output, and reduced the demand for exports and investment. The study recommended that monetary policies should be effected to ensure inflation rates are minimized and to ensure the stability of exchange rates in the country.

### **3. Methodology**

The study used time series data spanning 1997 to 2018 at quarterly frequency. The data were obtained from the Central Bank of Kenya and the World Bank. The stationarity test shows that the selected macroeconomic variable is either stationary at level, integrated to order one but non of the variables is an I(2) process. This justified the estimation of the relationship using an ARDL model. The specification of the econometric model

with the logarithm transformation of the variables is as follows;

$$\begin{aligned} \Delta \ln DPI_t = & \alpha_0 + \sum_{i=1}^p \alpha_{1i} \Delta \ln DPI_{t-i} + \sum_{i=0}^q \alpha_{2i} \Delta \ln Inf_{t-i} + \sum_{i=0}^q \alpha_{3i} \Delta \ln MS_{t-i} + \sum_{i=0}^q \alpha_{4i} \Delta \ln R_{t-i} \\ & + \sum_{i=0}^q \alpha_{5i} \Delta \ln Exr_{t-i} + \beta_1 \ln Inf_{t-1} + \beta_2 \ln MS_{t-1} + \beta_3 \ln R_{t-1} \\ & + \beta_4 \ln Exr_{t-1} + \mu_t \end{aligned} \quad (1)$$

Where DPI is domestic private investment growth, Inf is inflation, Ms is money supply, R represents interest rates, EXR is the nominal effective exchange rate and u is the error term. The interest rate variable is a vector consisting of both the short term and long term interest rates. These short term interest rates are repo rate, central bank rate, and t-bill rates. The commercial bank lending rate was the only long term interest rate considered in the study. The initial analysis involved investigating the macroeconomic properties of the selected time-series variables. This was done using unit root tests. When dealing with macroeconomic time series data it is important to determine the order of integration or non-stationarity properties of the series. If a vector  $y_t$  is integrated of order  $d$  (i.e.,  $y_t \sim I(d)$ ), then the variables in  $y_t$  need to be differenced  $d$  times to induce stationarity. If the individual series has a stochastic trend it means that the variable of this series does not revert to average or long-run values after a shock strikes and its distribution does not have a constant mean and variance meaning the time series data contain a unit root. Therefore, the unit root test is necessary to avoid spurious results from the regression analysis. The study applied Augmented Dicky-Fuller (ADF) and Phillips-Perron (PP) tests for unit roots. Where the results contradict, the study relied on PP test given its superiority to other tests. The great advantage of the Philips-Perron test is that it is non-parametric, i.e. it does not require to select the level of serial correlation as in ADF and therefore is more reliable and conclusive than the ADF test (Biometrika, 1988).

#### 4. Findings and Discussion

In testing for stationarity, a null hypothesis of non-stationarity is tested against an alternative hypothesis of stationarity. If the null hypothesis is rejected, then it means that the time series data is stationary. The results are illustrated in table 1 below. The results show that the Central Bank rate (CBK\_RATE ), Domestic private Investment growth (DPI ), Lending rate (L\_RATE ), Repo rate, and T-Bill Rate are stationary at the level  $I(0)$ . However, the rest of the variables are stationary at the first difference  $I(1)$  meaning that the individual time series have a stochastic trend and do not revert to average or long-run values after a shock strikes and the distributions have no constant mean and variance. However, the variables are integrated to order one, meaning that they are stationary at first difference. When modeling variables with mixed levels of integration, so long as none of the variables is an  $I(2)$  process, the best approach is to use the ARDL model. Therefore, the study adopted the ARDL Cointegration approach as well. Since the variables are not integrated of the same order, Autoregressive Distributed Lag (ARDL) modeling approach was applied and the Bound cointegration testing procedure used. The ARDL/Bounds Testing methodology of Pesaran and Shin (1999) and Pesaran and his colleagues (2001) can be used with a mixture of  $I(0)$  and  $I(1)$  data series, and different variables can be assigned different lag-lengths as they enter the model. However, none of the variables should be  $I(2)$ . The bound cointegration testing approach is carried out where coefficient diagnostics for the level lagged variables is done

using F-Test. The null hypothesis of the test is that there is no long-run equilibrium relationship (Cointegration) between the variables, that is,  $H_0: \theta_0 = \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = 0$ ; against the alternative that  $H_0$  is not true.

**Table 1:** Stationarity test using ADF and PP tests

Variable	Test	Test equation	Test statistics (level)	Test statistics (first difference)	Conclusion
Central Bank rate (CBK_RATE)	ADF	Intercept	-4.7250***	-6.7310***	I(0)
	PP	Intercept	-4.3084***	-6.4756***	I(0)
Domestic private Investment growth (DPI)	ADF	Intercept	-1.969	-3.0869**	I(1)
	PP	Intercept	-3.544***	-6.2387***	I(0)
Lending rate (L_RATE)	ADF	Intercept	-3.4675**	-5.2077***	I(0)
	PP	Intercept	-2.9481**	-4.6808****	I(0)
Consumer price index (LNCPI)/Infl	ADF	Intercept	-1.0607	-7.9839***	I(1)
	PP	Intercept	-1.0254	-7.9718***	I(1)
Money supply (LM1)	ADF	Intercept	-0.0852	-2.0562***	I(2)
	PP	Intercept	1.332	-6.4741***	I(1)
Nominal effective exchange rate (LNNEER)	ADF	Intercept	-2.3414	-8.4580***	I(1)
	PP	Intercept	-2.2740	-8.5931***	I(1)
Dollar rate/shilling (LN_USD)	ADF	Intercept	-0.276947	-9.20959***	I(1)
	PP	Intercept	-0.2769	-9.2096***	I(1)
Repo rate	ADF	Intercept	-3.588055***	-9.5282***	I(0)
	PP	Intercept	-3.1890**	-11.0611***	I(0)
T-Bill Rate	ADF	Intercept	-4.8314***	-5.8711***	I(0)
	PP	Intercept	-3.9057***	-5.3578***	I(0)

The ARDL Bounds Cointegration test results show that F-statistic (8.5453) is greater than the upper bound Pesaran’s critical values at 5% and 1% levels of significance. Therefore, the null hypothesis of no Cointegration is rejected. This confirms that there is a long-run relationship (Cointegration) amongst the variables included in the model. Therefore, the study can estimate a long run (Co-integrating) model without necessarily differencing the integrated variables. Confirmation of Cointegration nullifies the possibility of a spurious regression too. The study further employed various diagnostic tests to ensure the model estimated is appropriate.

**Table 2:** Cointegration Test

Specification	Unrestricted intercept and unrestricted trend; the number of regressors (k) = 7	
F – statistic	8.5453	
Pesaran Critical Values at 5% Level of Significance	Lower Bound	2.69
	Upper Bound	3.83
Pesaran Critical Values at 1% Level of Significance	Lower Bound	3.31
	Upper Bound	4.63

Before estimating the long-run model, the study estimated an unrestricted error correction model and tested whether the errors in the model have constant variance (homoscedastic). The results from the ARCH heteroscedasticity test shows that the F statistic of 0.3729 has a p-value of 0.5433 meaning that we cannot reject

the null hypothesis of the constant variance of the error term hence the model is homoscedastic. The error term of the conditional ECM should not be serially correlated. This study employed the Breusch-Godfrey Serial Correlation LM Test. The results of the test show that the F statistic of 0.011992 has a P-Value of 0.9881 meaning that we could not reject the null of no serial correlation at all conventional significant levels. The study tested for model specification and appropriateness using the Ramsey RESET test. A null hypothesis of the good specification was tested. The F-statistic was 0.267152 and the respective p-value was 0.6075 meaning that the study could not reject the null hypothesis that the model is well specified and no variables are omitted in the model. The study utilized the aggregate sum (CUSUM) and the combined sum of squares (CUSUMSQ) tests to determine if the model is stable. The CUSUM and CUSUMSQ insights are plotted against the break focuses. On the off chance that the plots of CUSUM and CUSUMSQ measurements remain inside the basic obligations of 5 percent level of essentialness, the H0 of all coefficients in the given relapse are steady and can't be rejected, so the model is stable. The results show that the CUSUM and CUSUMSQ plots are within the 5% confidence bands signifying that the model coefficients are constant and relatively stable over the entire period of analysis. There is no shift in model estimated coefficients. The general objective of the study was to investigate the effect of macroeconomic variables on the growth of private domestic investment. The effect was investigated by estimating a long-run model after testing and successfully establishing the existence of a long-run relationship or cointegration. The results are also presented in Table 3. The co-integrating model shows that the coefficient of determination (R-squared) is 75% meaning that 75% of the variations in the dependent variable (domestic private investment) are explained in the estimated model. The F-test which shows the joint significance of the model has a statistic of 28.88726 with a p-value of 0.000000. This implies that the coefficients of the fitted model are jointly different from zero at all conventional levels of significance. The other results are discussed as follows.

**Table 3: Long-run model**

	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
CBK_RATE	-0.324976	0.119550	-2.718333	0.0081
L_RATE	-0.128921	0.077202	-1.669904	0.0989
LNCPI/Infl	34.35384	4.037375	8.508954	0.0000
LNMI	8.259568	2.661941	3.102836	0.0027
LNNEER	-10.86511	3.257047	-3.335877	0.0013
REPO_rate	0.224084	0.094690	2.366493	0.0204
TBILL_rate	-0.009916	0.100594	-0.098576	0.9217
C	-147.9843	32.17958	-4.598702	0.0000
@TREND	-0.939964	0.084067	-11.18119	0.0000
R-squared	0.745242			
Adjusted R-squared	0.719444			
F-statistic	28.88726			
Prob (F-statistic)	0.000000			

The long-run model estimated in the study and illustrated in table 3 shows that the coefficient of a consumer price index (CPI) which is the proxy for inflation is 34.35384 and the respective p-value is 0.0000. This implies that private investment seems to increase with an increase in the general price levels. A 1% increase in the general price level (CPI) increases private investment by 34% in the long run. This relationship is explained by the fact that as the general price level increases, in the long run, it is more profitable for investors to hold

businesses hence the increase in domestic private investments. Secondly, over the entire study period, quarterly price levels have remained stable with inflation ranging from 3.94% to 5.22%. Moderate inflation (less than 10%), is good for economic performance and this magnifies the link between price levels and domestic private investment. Generally, the price levels have grown at a moderate rate incentivizing private domestic investment. The results in table 3 show that there is a positive and significant relationship between money supply and growth in domestic private investment with a coefficient of 8.259568 and a p-value of 0.0027. These results show that a 1% increase in the amount of money supply in the economy increases domestic private investment by 7%. The study used a commercial bank lending rate, the Central Bank Rate, and the repo rate as proxies for both long term and short term interest rates. The results in table seven-show that the central bank rate negatively and significantly affects domestic private investment with a coefficient of -0.324976 and a p-Value of 0.0081. A 1% increase in the central bank rate reduces the private domestic investment by 0.32%. This is expected given that a central bank rate is a reliable tool in monetary policy practice. An increase in central bank rate (contractionary monetary policy) is expected to increase the rate at which commercial banks borrow from the Central Bank and in return lending rates are expected to increase resulting in a decline in credit borrowed by the private sector. This is also reflected in the negative relationship in private domestic investment and the commercial bank lending rate. A 1% increase in the commercial bank lending rate decreases the private domestic investment by 0.12%. This is significant at a 10% level given the p-value of 0.0989. Regarding the 90 days, T-bill rates and repo rate, the effect of the former is negative but insignificant. However, the effect of the latter is significant at 5% level. A 1% increase in repo rate increases private investment by 0.22%. This is expected because the repo rate is the rate of discounting government securities held by the public and commercial banks. Increasing repo rate implies an expansionary monetary policy since it makes it more profitable to exchange government securities for cash through the banking system. This increases the money supply in the economy and returns private domestic investment increases. The results are consistent with the fact that a 1% increase in the money supply increases private domestic investment by 8%. In the analysis, the Nominal effective exchange rate (NEER) is an adjusted weighted average rate at which the shilling exchanges for a basket of multiple trading partner currencies. Also, the rate at which the price of the dollar against the shilling was used in the analysis as a proxy for the exchange rate. The results of the long-run model show a coefficient of -10.86511 and a p-value of 0.0013. This implies that a 1% increase in Nominal effective exchange rate (depreciation of the shilling) reduces private domestic investment by 11%. The results are consistent when the exchange rate of the dollar against the shilling was introduced in the model. The study obtained a coefficient of -0.031672 and a p-value of 0.0053. This implies that an increase in the price of the dollar (depreciation of the shilling) reduces private domestic investment by 0.03%. Depreciation increases the cost of imports especially for investment goods hence reducing private domestic investment. Secondly, depreciation induces financial outflows from the economy as investors seek more stable investment markets in the world markets. This leads to capital outflow and a reduction in private domestic investment. Since the study established a long-run model and presented it in table 3, it is also critical to determine how fast the model adjusts to the long-run equilibrium relationship in case a shock impacts on the economy. To address this concern, the study established an over-parametrized error correction model and worked from general to specific model by eradicating the insignificant variables to obtain a parsimonious model the error correction model is presented in table 4. The most important parameter in this model is the coefficient of the lagged error term

obtained from the long-run model in table 3. The coefficient is negative and significant as expected in theory. This signifies that 62% of any disequilibrium in the model is cleared at every quarter. In case of any shock, after two quarters, the variables will return into the long run co-integrating relation.

**Table 4:** Error correction Model

Dependent Variable: D(DPI)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DPI(-1))	0.597712	0.108354	5.516272	0.0000
D(DPI(-3))	-0.160034	0.090374	-1.770802	0.0814
D(CBK_RATE)	-1.496458	0.548470	-2.728422	0.0082
D(CBK_RATE(-1))	1.003083	0.324419	3.091942	0.0029
D(LNCPI)	104.1848	32.11981	3.243631	0.0019
D(LNCPI(-1))	-62.08802	31.46696	-1.973118	0.0528
D(LNM1)	47.19744	16.81083	2.807562	0.0066
D(LNM1(-2))	-53.43396	16.48464	-3.241439	0.0019
D(TBILL)	0.617547	0.390918	1.579736	0.1191
D(REPO)	0.709279	0.344273	2.060223	0.0434
Lagged error correction term	<b>-0.629160</b>	0.225686	-2.787770	0.0070
R-squared	0.443472			
Adjusted R-squared	0.356514			

**5. Conclusion**

This study sought to determine the relationship between domestic private investment in Kenya and a set of selected macroeconomic variables. These macroeconomic variables are; central bank rate, the repo rate, t-bill rate, money supply, exchange rate, and inflation. The time series variables were first tested for stationarity and the results informed the use of the ARDL model for analysis. The bound cointegration testing procedure revealed the existence of a long-run cointegration. The long-run cointegrating model estimated shows that private domestic investment varies significantly and negatively with the central bank rate and the commercial lending rate. However, an increase in the money supply increases the level of investment. Another significant observation is that moderate inflation is critical in increasing the level of investment. These results point to one critical revelation; monetary policy conduct is essential in driving private domestic investment. This is amplified by the fact that both central bank rate, which is the key monetary policy anchor, and the commercial lending rate which in turn is pegged on the central bank rate are significant determinants of private domestic investment. Therefore, for the government to drive the economy to a growth trajectory, monetary policy conduct is essential. Further, the strength of the shilling matters significantly in determining private domestic investment. Since monetary policy also seeks to stabilize the exchange rate besides its key role in price stabilization, the policy role in creating the right macroeconomic environment for investment to thrive cannot be understated. The error correction model shows that any deviation from the cointegrating relationship is corrected within two quarters.

**6. Recommendations**

Based on the findings, the study deduces the following policy and managerial recommendations.

**6.1 Policy recommendations**

First, there is a positive significant relationship between inflation and private domestic investment growth noted under a period of stable inflation not exceeding 6%. Moderate inflation (less than 10%), is good for economic performance and this magnifies the link between price levels and private domestic investment. The findings support the inflation targeting framework of the Central Bank of Kenya which stipulates that inflation shall be 5.0 percent, with a flexible margin of 2.5 percent on either side in the event of adverse shocks. Monetary policy conduct therefore, should seek to ensure that both internal and external shocks do not breach inflation targets. Secondly, the positive significant relationship between inflation and private domestic investment growth implies that the CBK can actively intervene into financial markets to ensure inflation remains stable and within range. In similar vein, the CBK can credibly stabilize price bubbles by active policy intervention into the financial markets. Thirdly, the study finds a significant and positive relationship between money supply (M1) and the growth of a private domestic investment. These finding buttresses an accommodative monetary policy. That is, CBK can boost economic growth by changing money supply, inducing private domestic investment and therefore increasing economic activity. This link emphasizes the role of monetary policy in stabilizing economic shocks in the economy especially in the long-run. Lastly, the negative relationship between commercial bank lending rate and short-term interest rates implies that the monetary policy transmission through interest rates channel is effective and reliable. Therefore, CBK can influence prices and economic activity by reliably using the interest rates channel. Further, the study reveals dependable insights on financial deepening. First, the study finds a significant and positive relationship between money supply (M1) and the growth of a private domestic investment. Therefore, the study recommends innovative ways that increase the segment of the monetized economy in the country. Financial innovations that increase access to finances and ease of transactions methods especially cashless transactions platforms are crucial for private domestic investment growth. Besides, money supply aggregates (M1) is an essential component of the monetary policy implementation framework. The variation of this money supply component through monetary policy instruments e.g. the critical reserve ration, Open Market Operation, and central bank rate can be useful in increasing private domestic investment to the expected levels. Secondly, the increase in commercial bank lending rates is negatively significant in driving investment. The study advocates for policies that ensure the commercial banks remain liquid and maintain low lending rates. These policies include the liberation of the financial markets for more competition and support for more innovative but secure money lending avenues like mobile money markets. Lastly, the study recommends active financial market intervention through monetary policy to ensure commercial bank lending rates are within the conventional range for private domestic investment to thrive. The study finds that the depreciation exchange rate has negatively affected the growth of investment growth in Kenya during the period of study. Depreciation increases the cost of imports especially for investment goods hence reducing private domestic investment. Secondly, depreciation induces financial outflows from the economy as investors seek more stable investment markets in the world markets. This leads to capital outflow and a reduction in private domestic investment. This study recommends for use of monetary policy interventions to preserve exchange rate stability especially against the dollar in which Kenya trades predominantly. Second, there is a need for the Central Bank to maintain the forex reserves to cover against exchange rate shocks which may impair the long-term growth in private domestic investment. Lastly, the study recommends the enactment of measures to increase exports, which in return increases dollar supply and hence appreciation of the shilling. Such measures include direct export promotions, increasing trade openness as

well as incentivizing key internationally traded products like horticulture, tea, and coffee.

## **6.2 Managerial policy recommendations**

At the firm level, several policy recommendations are deduced from the study. First, commercial banks should seek to increase credit uptake by adopting more conventional but innovative ways of lending. As the money supply increases in the economy, the investment levels increase, and therefore economic activity increase. This chain of causation, as revealed in the study informs commercial bank policy on credit expansion through innovation. Second, the study reveals investment risks emanating from exchange rate fluctuations. Exchange rate movements impact returns when a change in the value of one currency against another currency leads to a rise or fall in the value of an asset. Therefore, investment firms and large-scale importers should consider hedging against exchange rate fluctuations possibly through forward exchange contracts. Lastly, the conduct of monetary policy is predictable given that the implications of variations in the money supply aggregates, short-term interest rates have a known effect on lending rates, investment, and economic growth. Therefore, firms can easily monitor their interest rate and investment risks emanating from any changes in monetary policy anchors.

## **7. Limitation of the Study**

The study experienced a first slow response from the respondents who did not have data on the selected variables assembled but dispersed in various publications. The underlying data situation in Kenya was problematic as adequate data on domestic private investment was not easily available, and the available data was not updated online or easily reachable. Most of the data had to be manually collected from many publications. This was alleviated by having constant follow up on phone, emails and physical visits to the respondents' offices to get the publications and mine the data from their relevant libraries.

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