University of Nairobi

IMPACT OF MACROCONOMIC VARIABLES ON DOMESTIC INVESTMENTS IN KENYA

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DECLARATION

I declare that this research paper is the original work and has never been presented for examination in any other University.

STUDENT

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THE APPROVAL

This research work has been submitted for examination in the University of Nairobi with my approval as the University Supervisor.

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DEDICATIONS

This paper has been dedicated to my beloved spouse Jane, my children, Collins, Alicia, Ethan and my beloved late Mother Beatrice Muthamia (may her soul continue resting in eternal peace).

May the Almighty Great Lord bless them all.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criteria
CUSUM	Cumulative Sum
LM	Lagrange Multiplier
SBC	Schwartz Bayesian Criterion

ABSTRACT

The research set to investigate impacts of macroeconomic variables on performance of domestic investments for Kenya from 1975 to 2018. ARDL estimation technique was employed in estimation of domestic investments model. Macroeconomic variables under study included; GDP, Government expenditure, inflation, interest rates, amount of credit to private sector, external debts, trade openness and exchange rates. Time series properties on stationarity test were conducted using ADF unit root tests. The finding showed existence of differences between macroeconomic factors on domestic investment. For the long run period, results revealed existence of significant effects for GDP, public expenditure, real exchange rates and trade openness variables on domestic investments in Kenya. However, no significant effects established for the inflation, real interest rates, external debts and credit to private sector on domestic investment. Conversely, the estimated short-run model revealed that GDP annual growth rate, public expenditure, external public debts first lag and real exchange rate first lag had short run significant effects on the performance of domestic investment at 5% significant level. The rest of the variables that include, credit to private sector, inflation, interests' rates, trade openness had expected signs but coefficients were not significant. Shocks in the economy were represented by co-integrating ECM coefficient of negative 0.76 and t-statistics significant at 5% level. This suggests that previous short run shocks convergence to long run equilibrium at a speed of 76% thus takes approximately one and half years. The results suggest the need for the government of Kenya to ensure enabling macroeconomic environment and promote domestic investment enhancing policy for accelerating economic transformation.

CHAPTER ONE

INTRODUCTION

1.1 Background

Domestic investments contribute significantly to social economic development of a country through accelerating economic growth, employment creation and poverty reduction amongst other benefits. Domestic investment comprises private sector and public sector investments. Public investment is autonomous and has indirect effects on growth. On the contrary, private investment has direct effect on economic development (Ngoma, et al., 2019; Eklund, 2013; Khan and Reinhart 1990).

Developing and developed nations across the world are keen to achieving and sustaining high-level growth rates of their output through macroeconomic policies strategies and use of domestic private investment for economic growth and transformation. Domestic private sector investments drive investments in a country. (World Bank, 2019; Ocran M., 2019; Oshikoya, 1994).

Kenya adopted various transformative reforms since independence geared towards enhancement of economic growth and development (Republic of Kenya, 1965; Republic of Kenya, 2012). Key among these reforms included; the market-led economic growth model of the 1980s championed by the Britton Wood Institutions, the vision 2030 economic transformation blue print, the big four transformative agenda among others. All these reform agendas have underscored the significance of domestic investment as a priority critical success factor in achieving the desired national economic transformative goals (Republic of Kenya, 2018; Republic of Kenya 2012; Republic of Kenya, 1965). Domestic investments impact positively to the expansion of Gross Domestic Product and therefore, key to long term growth of a country.

Despite these efforts, performance of domestic investments in Kenya has continued to perform sluggishly at low average rate of 20.3 percent of total output over the last five decades as shown in Figure 1, estimated at 6.7 percentage points below the target of 27 percent under Vision 2030 of the Kenya National Development Plan (Republic of Kenya, 2018; republic of Kenya, 2003). This performance is relatively low compared to developing economies with similar GDP characteristics over the same period such as those from Southern Asia and African Countries as noted by Ngoma,

et al., (2019) hence necessity for the analysis to provide deeper insight on domestic investments determinants in developing nations such as Kenya.

While simple accelerator theory asserts that particular levels of capital stock are critical to produce a required output targets, flexible accelerator theory advance the arguments of existence of non-constant relationship between investment and outputs implying existence of other factors which alters levels of desired capital stocks and hence desired investments levels (Konor *et al.,* 2016). As asserted by (Mwesigwa, 2018), other factor which alters cost of investment alters desired capital stock and investments levels includes; interest rates, foreign exchange rate and inflation amongst others. However, the studies are inconclusive on cyclic dynamics on short term and long-term impact on desired capital stock and investments levels. Although some studies have tried to use the flexible accelerator theory in their analysis, the results are mixed (Eklund, 2013). On the other hand, Tobin Q theory asserts that ratio of capital stock prevailing in the markets to the costs of replacements of depleted capital stock influences levels of investments. The two-gap theory also advances that the savings-investment gap and import-export gap are critical in influencing investment levels, (Jorgenson, 1971). According to Keynes (1936), most investment decisions are made out of gut feeling and neoliberal theory which emphasized on the importance of financial deepening or increased credit to businesses for increased levels of investment.

Recent empirical studies on the topic (Ngoma *et al.,* 2019; Mwesigwa, 2018; King'ori, 2007; Mutenyo *et al*., 2010) have identified that macroeconomic variables impacts domestic investments, however, the studies are not conclusive on significance and direction of the impact in regard to trade openness, public expenditure, external debts, interest rates and amount of credit to private sector. Although most studies have demonstrated that domestic investment plays integral role in social economic development and inclusivity, a deeper understanding on its determinants would be critical for the guidance of policy formulation. Past studies (Njunu, 2016; Garikai and Onyango, 2018; Mutenyo *et al*., 2010) have found that domestic investments plays fundamental role in economic development and transformation. King'ori, (2015) found that in developing countries such as Kenya, domestic investment may have direct effect on firm's profitability.

As evident by the theoretical and empirical literature reviewed, past investigations on determinants of investments in Sub-Saharan region and emerging economies have produced varied results raising several important questions such as the extent of macro-economic variables influence over the short and medium term on domestic investment (Onyango et al., 2019; Ocran, 2019; Khan and Reignhart, 1990). In an effort to analyse the macroeconomic factors that determines investment growth using panel data from year 2000 -2017 factoring 35 Sub-Saharan African (SSA) countries, a research by Ngoma, *et al.,* (2019) employed pooled regression fixed and random effect model and panel corrected technique. The study results fount that SSA economies domestic investments were largely influenced by GDP, real interests rates public investments and inflation. However, the study was inconclusive on variables effects of short and long run including direction of influence.

Moreover, majority of past empirical studies applied different econometric analysis methods and different time frames in the various studies. As evidence shows, mixed results could be attributed to among other factors; different characteristics for various countries and their experiences, different data set used, different econometric analysis methods and different time frames applied in various studies (Garikai and Onyango, 2019; Konor et al., 2016; Ribeiro and Teixeira, 2001). However, the challenge is that these studies have inconclusive results on effects of domestic investment that may be explained by uniqueness of individual economies which necessities the analysis their effects on domestic investments for Kenyan scenario.

1.2 Domestic investments trends in Kenya

Domestic investments are proxy for the gross domestic capital formation in an economy. In Kenya, since independence in 1963, gross domestic ration of GDP averaged 17.61 in first decade to 23.22 in the 1970s and 22.26 in 1980s during the second and third decades after independence. However, investment plummeted in fourth decade of 1990s at 17.66 with the lowest level of 15.00 in 1996 but then picked up at a slow rate again from 2000s averaging 19.09 during the fourth decade to 21.15 in the fifth decade of 2010s despite lower levels of 18.44 recorded in year 2018 (Republic of Kenya, 2019; World Bank, 2019). Figure 1 shows performance of Kenya's domestic investment from 1960 - 2018.

Figure 1: Kenya's Gross Capital Formation Trend: 1963 – 2018
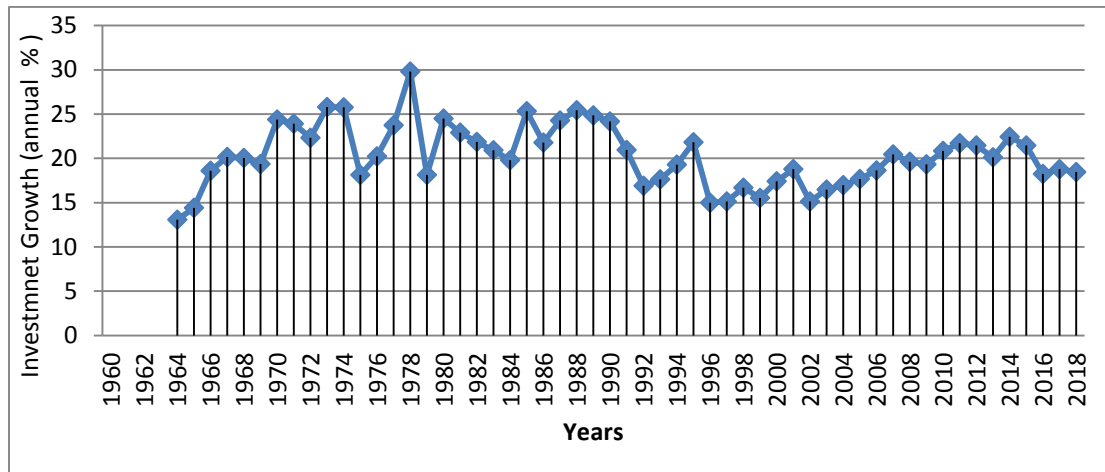
Source: World Bank, National Account Data, 2019

Ease of doing business, conductive environment provides critical opportunities and encouragement for individual firms, households and domestic investors to increase their productivity and profitability levels hence stimulating their expansion capabilities for employment creations and therefore accelerating economic growth, and better transformation of livelihoods (Republic of Kenya, 2019; World Bank, 2019). The research asserts the importance of strong sound institutions, stable macroeconomic, well defined property rights and reasonable predictability of government policy options (Ndungu and Muriu, 2017). In addition, World Bank (2018) notes openness to international markets plays critical role for investment growth since it facilitates capital and resource flow.

In Kenya, the worst economic performance was witnessed during the 1990's with the lowest records of GDP growth rates of below two percent (Institute of Economic Affairs, 2000). The lowest performance happened during the period when Kenya Economy was under the liberalization policy spearheaded by the Britton wood institutions intended to spur domestic investment and growth. Domestic investments play significant influence in enhancing growth and development process geographically, economically and socially inclusive (World Bank, 2019).

1.3 The Problem Statement

Domestic investment plays fundamental role in enhancement of sustainable long-term economic growth. Literature reviewed indicates domestic investment leads to increased economic performance. Garikai and Onyango, (2018); Konor, et al., (2016) findings also supported this argument for Sub-Saharan Africa countries. Based on demands for clear knowledge on domestic investments, governments improve control of domestic investment in the desired levels for accelerated economic growth (Republic of Kenya, 2018). This critical decree and its importance have been collaborated by past empirical studies (Garikai & Onyango, 2018; Konor et al., 2016).

Despite the initiatives, levels of domestic investments in Kenya have continued to remain low as evidenced from domestic investment capital formation data. Figure 1 shows the highest percentage ever recorded was in 22.5 percent of GDP in 2015 (Republic of Kenya, 2018; World Bank, 2019). This undermines the desired levels under vision 2030 for Kenya development blue print which targets steady annual growth rate of 27 percent of GDP to the year 2030 (Republic of Kenya, 2018). In addition, investment levels have remained low with high volatility both in the medium term and long run as witnessed during 1980s and 1990s coinciding with critical time when the government was implementing wide range of reforms including the structural adjustment programmes instituted by Britton Wood institutions.

It is therefore, imperative that we understand the causes of these short-term dynamics and their long-term relationships since low levels of domestic investment coupled with high volatility elicits mixed debates, as the expected desired quality of life resulting from steady economic growth targets dwindles. In this light, stimulation and acceleration of growth, including long term sustainability for economic transformation, call for appropriate policy formulation which is based on analysed information on dynamics of domestic investments volatility on selected macroeconomic variables so as to inform appropriate policy formulation. The research sets to fill the gap using macroeconomic data for spanning from 1975 to 2018 by analysing selected macroeconomic variables dynamics employing Autoregressive Distributed Lags (ARDL) econometric techniques so as to bridge the gap and obtaining clear understanding of domestic investments determinants for the Kenya case.

1.4 Research Questions

Research questions addressed were;

  i. What are the main macroeconomic variables influencing domestic investments in Kenya over the short-term period?

  ii. Which are the main macroeconomic variables that influence domestic investments in Kenya during the long run period?

  iii. What are key policy measures to be adopted by Government for accelerated Kenya's investments?

1.5 Research Objective

The research undertook analysis of effects of macroeconomic variables on domestic investments for Kenya between 1975 and 2018.

The specific research objectives were;

  i. To analyse macroeconomic variables influencing Kenya's domestic investment over the short run period

  ii. To analyse macroeconomic variables influencing domestic investments in Kenya in the long run

  iii. To draw conclusions and prescribe recommends for policy choices.

1.6 Significance of the study

The significance of the research rests on important role of domestic investments in accelerating economic processes and transformation of countries and hence should be prioritised in order to reduce social and economic challenges facing Kenya. Improving the lives of the communities is based on rate of investment growth. It will provide diversity of policy options for the policy makers and students and scholars in the study area.

1.7 The Scope

The research covered period between 1975 and 2018. The period of study was limited by short time required to finalise the paper, limited budget, though focused on time when privatization of public sector reforms was being undertaken.

1.8 Organisation of the paper

It begins with introduction and background followed by chapter two which captures the review of theorical and empirical literature. Research method, theoretical and empirical, models are discussed under chapter three. The data is presented, analysed and results discussed under the fourth chapter. Finally, the research summaries, recommendations and conclusions are captured under the fifth chapter.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Theories and empirically studied literature underpinning this research area are critically reviewed for better understanding of the variables being analysed.

2.2 The theoretical literature

This part illuminates the theories and relevant literature review of the domestic investment and some of the approaches commonly employed in explain investments including Keynesian's investment theory, flexible accelerator investment theory, Tobin Q theory of investment, two-gap investment theory neoclassical/ flexible accelerator investment theory.

2.2.1 Keynesian Investment Theory

Keynes investments theory was centred in two main ideas relating to liquidity preference and the capital marginal efficiencies. Keynes equated the marginal efficiency of capital with the present value of the internal rates return of the projected cash flows. The theory argues that investments would be prioritised when marginal efficiency of capital (MEC) surpasses or equates to the financing costs –real interest rates (r) yields (Keynes, 1936).

The theory emphasised on the significance of rates of interests in investment decision making process. It argues that declining interests' rates points to diminishing of the cost in investment compared to expected potential gain. An investment project undertaken by firms will only be made if the discounted gains exceed the project costs (Ndungu & Muriu, 2017). Keynes further argued that investment levels were not determined by rate of interests but on the income levels (Keynes, 1936; Ribeiro & Teixeira, 2001).

2.2.2 Flexible Accelerator Theory

Chenery (1952) and Koyck (1954) developed the theory as an advancement of the simple accelerator theory. According to flexible accelerator theory, relationship between investments and outputs are influenced by other aspects such as costs of investments. The model employs lags between levels of capital stocks in the alteration process.

8

$$Ke = K_e \,(Y, C, P) \tag{1}$$

Whereas; Ke denotes the level of equilibrium capital stock investments, Y outputs levels, C denotes user's costs and P the output price.

The flexible accelerator model assumes capital stocks investment lag depends on levels of previous outputs though in declining geometrics.

$$K_t = K_t, K_{t-1}, K_{t-2,}K_{t-3}, \dots\dots\dots\dots\dots\dots\dots\dots\dots. K_{t-n} \tag{2}$$

However, flexible accelerator's main strength is its suggestion of existence of other variables influencing investment other than the outputs including; real rates of interests, foreign rates of interests, inflation, trade liberalisation among others (Keynes 1936; Eklund, 2013)

Additionally, flexible accelerator theory on the other side has shortcomings in estimating investments functions in developing economies (Junankar, 2017).

2.2.3 Tobin's Q-Investment Theory

 The theory is centred on markets. It asserts that investment levels usually depend on present value of the already installed capital stock in comparison with the cost of replacing the existing capital investments. The ratio posits that firm's interests are to raise its capital investments whenever the ratio is greater than unitary and vice versa (Tobin, 1969).

2.2.4 The two Gap

The two Gap investment theory was developed by Chenerly and Strout and it reinforces Harrold Dormer theory of economic growth. Harrold Dormer argues that economic growth is a function of capital output ratio and the levels of savings (Acosta, 2005). The theory emphases of the existence of two gaps in the economy namely; the investment-savings and the export-import usually the foreign exchange gap. It is therefore implied that as savings decreases, there is decreased borrowing and hence low investments. In the case the second gap, the difference in forex earning and the quantity of imports that is demanded in the production of desired outputs. It is implied that foreign capital inflow would exhibits multiplier effects on investments demands. Consequently, demands

for external capital increases so as to fill the gap with the understanding of increased motivation to investment (Tobin, 1969).

Additionally, scarcity of forex would scale back economic process by confining unit increase of import to savings (Mohsen, 2015). Research has demonstrated that developing nations including Kenya suffers from depleted savings and forex earning being factors hindering economic growth and development. In relation to this study, Kenya could aim at maximizing the level of savings that will ultimately lead to increased investments. Industrialization should also be increased and majorly through foreign direct investment with an aim of reducing the country's current account deficit.

2.3 Empirical literature Review

The review of literature studied aims at having a deeper understanding of dynamics in investments determinants over time. Mbaye (2014) studied relationship between investment and output, the determinants of new levels of domestic investment in Kenya dating 1970 to year 2010. Estimated long-run regression showed that rate of economic growth, exchange rates and money supply gave positive but significant consequence on domestic investments levels. Mbaye (2014) study further found other macroeconomic variables including trade policies, domestic savings, lending rates and external debts had positive by insignificant implication on domestic investments. According to Onyango *et al.,* (2019), markets plays significant role in influencing new investments. In addition, the study established that credit levels to private sector influenced the domestic investments.

Mwesigwa (2018) study on Capital formation in Uganda from 1984 to 2016. The research specifically aimed to assess the influence of trade openness and the subsequent rise in foreign direct investments arising from it on capital formation. The study estimated results indicated that, at the long-run, it is trade openness, foreign direct investments, level of savings and external debt that are the key determinants of capital formation. The author found that in the short run, its only external debt rather than trade openness and foreign direct investments that determines capital formation.

10

King'ori (2007) studied factors that influencing domestic investment in Kenya based on data sourced from national accounts and trade statistics for the country with annual observations for the period 1970-2003 through socio-economic explanatory variables. The factors studied included; savings, income, aid, concessional loans, foreign exchange availability, interest rates, output price and the variability of returns to investment using specified simple model estimated in logs by OLS method. The study found that domestic funds, aids and concessional loans affects the growth of domestic investments. The author found that the demand - side factors impaired growth rates of investment by increasing variability capital stock prices. The research recommended for the review of the banking act, reduction of government borrowing from the domestic market and increased government investment on physical infrastructure.

Kinuthia and Murshed (2015) examined in relative setting, effects of FDIs in Kenya versus Malaysia including their influence on the outputs using 1960-2009 data set. The study analysis employed a vector autoregressive model. The study findings supported the influence of FDI in Malaysia's industrialisation. However, the study did not support the foreign direct investment influence for the growth in Kenya industrialisation process. The author established that the success in Malaysia in attracting significant FDI relative to Kenya was attributed varying macroeconomic stabilization policies, trade liberalisation, infrastructure development and institutional arrangements causes.

Garikai and Onyango (2019), Kazeem *et al.,* (2012) research with data set ranging between 1970-2010 using advanced autoregressive distributed lags econometric technique found existence of difference determinants of domestic investments. In consequence, the study established that outputs, rate of exchange, rates of interest, external debts, public investments, private sector credit levels had long run causality whereas real GDP, public investments, trade liberalisation demonstrated significance in the short run. However, the study did not establish the magnitude of causality.

Frimpong et al., (2010) undertook similar study in Ghana using ARDL framework for 1970-2002 data sets. The findings revealed that in the shortrun, investments were impacted by public investments, inflation, real interest rates, trade openness, exchange rates and regime of

constitutional authority, whereas GDP, Inflation, external debts, real interests rates and openness influenced domestic investments significantly during the long run.

Garikai and Onyango (2019) used the ARDL modelling for the period 1970-2015 to analyse the Senegal's factors determining domestic investment. The paper established inclusive results on the direction of influence.

According to a study by Acosta *et al.,* (2005) for Argentina case on short run and long run determinants of domestic investments, with data spanning from 1979 to 2000, it revealed that the main factors includes exchange rates, inflations, trade openness and GDP volatility while domestic credit market and external debts were the main determinant of domestic investments over the long run.

Ngoma *et al.,* (2019) in his study on macroeconomic factors affecting domestic investment using panel data covering 2000 – 2017, for 35 Sub-Saharan African (SSA) economies, by employing pooled regression, fixed effect and random effect model as well as Panel Corrected-standard Error (PCSE) approach. The study findings indicated SSA region domestic investments are determined by GDP, Interest rates, public investment an inflation.

2.4 Overview of literature

The literature on capital formation particularly the link between macroeconomic variables such as trade openness, public investment and interest rates is indecisive (Acosta, 2005; Konor, et al., 2016). This divergence in empirical results can be ascribed to sample sizes, methodologies and analytical tools applied in the studies and country specific characteristics such as level of economic development, technological, infrastructural, institutional developments, demographics, political and cultural orientations. This study hence attempts to examine the Kenya-country specific case by analysis to add knowledge to the field.

The reviewed literature demonstrated a number of theories utilised in explaining investment dynamics. Consequently, empirical evidence indicates existence mixed findings on the determinants of the domestic investments. While limited reviews in Kenya, resulted to inconclusive, the need to analyse the degree and directional of the impacts is critical. The research

will use ARDL approach in the estimation in the analysis while seeking to fill the gap. Borrowing from theoretical review and earlier empirical studies within and outside the country this paper factors GDP, Public investment proxied as public expenditure or government spending, inflation, real interest rates, private sector credit levels, external debt, trade openness and exchange rate in the analysis of the domestic investment model.

CHAPTER THREE
METHODOLOGY

3.1 Introduction

The research design, theoretical framework, empirical model, estimation techniques and the variables used in the research are discussed in this chapter.

3.2. Research Design

Quantitative causal research design was employed. Annual time series data for GDP, public investment, external debts, private sector credit, interest rate, inflation, trade openness, foreign direct investment, exchange rate for Kenya from 1975 to 2018 was used, thus on average, the number of observations for the analysis was 44. The quantitative analysis of the data first involved carrying out diagnostic tests to examine characteristics of variables considered in the empirical analysis and to identify the most appropriate estimation method. Further, the paper carried out post estimation test to establish the efficiency of the estimators before the discussion of the results findings.

3.3 Theoretical Framework

Central theory to this paper is the flexible accelerator theory developed by Jorgensen (1967). It posits that desired capital stock K_t is proportional to real output Y. The model is most regarded compared to other popular investment models. However, it has faced data limitations and other structural rigidities. According to accelerator theory, the desired optimal investment levels are determined by the output levels. There is direct proportionality between the desired capital stock to levels of income (Y) over the long run.

$$K_t = \alpha Y_t \tag{3}$$

Where α is constant. Differencing equation (3) in respect to time, t;

$$\Delta K_t = \alpha \, \Delta Y_t \text{ , whereas } \Delta = \text{Difference operator} \tag{4}$$

Functional relationship between investment and desired capital stock is obtained by;

$$K_t = (1 - \partial)K_{t-1} + I_t \tag{5}$$

Where ∂ denotes depreciation of capital and I is the conventional capital accumulation signifying investment. From (5) we obtain;

$$K_t - K_{t-1} = I_t - \partial K_{t-1} \qquad (6)$$

We can solve for I_t by rearranging the function and assuming $\partial = 0$,

$$\Delta K_t = I_t \qquad (7)$$

Substituting (7) in (4) we get;

$$I_t = \alpha + \Delta Y_t \qquad (8)$$

Equation (8) is the elementary investment function representation. In order to capture slow adjustments of the actual capital stock to the desired capital stock lagged values of the investment variable and real outputs are introduced in the model to obtain equation (9);

$$I_t = \rho I_{t-1} + \beta_1 \Delta Y_t + \beta_2 \Delta Y_{t-1} + \varepsilon_t \qquad (9)$$

Where ε_t factors the effects of omitted variables, $and\ \beta$ is the coefficient.

Hence the investment function can be estimated as;

$$I_t = \rho I_{t-1} + \beta_1 \Delta Y_t + \beta_2 \Delta Y_{t-1} + \vartheta_{nt} X_{nt} + \varepsilon_t \qquad (10)$$

Whereas $\vartheta_{nt} X_{nt}$ represents macroeconomic variables that includes fiscal policy related, openness and other factors that affects firms desire to raise investments to the desired level. The accelerator theory predicts when output of firms increases investments stock increases (Junankar, 2017).

3.4 Specification of the empirical model

The theoretical modified flexible accelerator model presented in Equation (10) was augmented by incorporates macroeconomic variables that includes; interest rates, inflation and foreign exchange rate, fiscal policy variables captured by public expenditure and external debts, trade policy

15

variables captured by openness affecting firms desire to increase investment stock as identified in the literature so as to undertake the study analyse and was stated as follows;

$$DINV_t = f(DINV_{t-1}, \text{ GDP}_t, \text{ PUE}_t, \text{ CPS}_t, \text{ INF}_t, \text{ EXDT}_t, \text{ RIR}_t, \text{ OPP}_t, \text{EXCH}_t) \tag{11}$$

Where; DINV is the dependent variables referring to domestic investment levels, $DINV_{t-1}$ lagged domestic investment, and the explanation variables GDP represents economic growth rate, PUE is the public sector Expenditure, CPS represent the amount of credit to private sector, INFL is inflation, EXT signifies external debts, RIR is the real interest rates, OPN signifies trade openness and EXCH denotes real exchange rate and t denote time.

The economic model (Equation 11) is transformed into econometric model equation (12) to arrive at linear exponential trend as follows:

$$DINV_t = \alpha_0 + \alpha_1 DINV_{t-1} + \alpha_2 GDP_t + \alpha_3 PUE_t + \alpha_4 CPS_t + \alpha_5 INFL_t +$$
$$\alpha_6 \text{EXDT}_t + \alpha_7 \text{rIR}_t + \alpha_8 \text{OPP}_t + \alpha_9 \text{EXCH}_t + \mu_t \tag{12}$$

Where the coefficients $\alpha_1 to \alpha_9$ denotes respective variable parameters α_0 denotes constant term, t denotes time μ_t white noise error**.**

3.5 Definition and measurements of variables

Definitions and measurements of the model variable plus expected signs are presented in this section as below;

3.5.1 Domestic Investment

The dependent variable under study is domestic investment and it is proxied by gross capital formation. Its definition is the additional to the gross domestic capital stock of assets subtract any sales of second hand and scraped assets (World Bank, 2019).

3.5.2 Gross Domestic Product

Defined as nation's sum of gross value added by all resident producers in the economy in addition to any value addition plus any products tax, subtraction of any subsidies excluded in the estimation

of the value of product (World Bank, 2019). Theoretically, rise in GDP is expected to result to improvement in domestic investments thus a positive relationship is hypothesised.

3.5.3 Public Expenditure

Public expenditure is the government spending on goods and services financed through tax revenue (World Bank, 2019). It is a ratio of government spending to the Gross domestic product. It is assumed to be autonomous and has a multiplier effects on domestic investment if applied in the improvement of physical and social infrastructure. Then on this scenario, the expected sign is positive. Conversely, it causes crowding out of domestic private investments if it is financed through domestic borrowing. In this case the expected sign is negative. Therefore, the prior expected sign is indeterminate.

3.5.4. Private Sector Credit

These are financial facilities extended to domestic enterprises for investment such as loans trade credits that bears future payment obligations. It is theoretically expected to boost domestic investment (World Bank, 2019) thus the expected prior effects on domestic investments were positive hence the prior expected sign is positive.

3.5.5 External Debts

This is defined as the total debts claims by external residents settled in foreign currencies or products. The burden of debts service obligations signals to reduction of investable resources. Expectations that high taxation required for debts servicing would reduce anticipated future profitability and hence reduces profitability of the investment. Future uncertainties in regard to policies required to cater for an equivalent risks of debts service obligation points to dampen investment decisions (World Bank, 2019). Hypothesised is negative relationship with domestic investment, therefore expected sign was negative.

3.5.6 Trade Openness

This is a trade indicator term used for signalling external shocks to the economy. The volume of exports is represented by values of traded goods and services to the external economies. The

imports volumes are represented by goods and services received externally for foreign economies (World Bank, 2019). Trade openness is a measure of countries liberation to the outside global economies.

$$\text{Openness} = \frac{\{\text{Exports} + \text{imports}\}}{\text{GDP}} \qquad (13)$$

Theoretical expectation of effects was ambiguous (Mohsen, 2015)

3.5.7 Inflation

Inflation rate represents annual changes of costs to the consumer average basket. The inflation is usually measured using Laspeyres formula (IMF, 2019). Theorical expectation is that inflation is key indicator for macroeconomic stability therefore rising inflation generates discouragement to domestic investment (World Bank, 2019). Prior expected sign was negative.

3.5.8 Real Interest Rates

This is defined as the lending rates of interests factoring for inflation as measured by GDP deflator (IMF, 2019). Assumed to have negative connotation with domestic investments in case of developing countries and equally for the developed economies. The argument being that higher rates of interests creates motivations for financial institutions to advance more credits thus boosting capital formation and ultimately increasing domestic investment (World Bank, 2019). Prior expectation either positive or negative.

3.5.9 Exchange Rates

The exchange rates may be used as an indicator of external shocks to the economy. It affects import costs hence depreciation of exchange rates rises the imports costs. Conversely, the depreciation of exchange rates generates incentives for additional investment in the export oriented sector as it raises attractiveness and volume of export (World Bank, 2019). Prior expectation of exchange rate on domestic investment was therefore uncertain.

3.6 Variable estimation techniques and Procedure

Descriptive and quantitative techniques were used. Stationarity time series properties were determined by carrying out unit root tests on all variables under investigation. ADF and Philip-Perron test were preferred in establishing level of integration so as to remedy spurious regression outcomes. Consequently, test for normality using Jarque Bera test was performed. Co-integration bound tests were further performed to ascertain the long run relationships. Autoregressive Distributed Lag approach was employed due to autoregressive nature of the dependent variable and distributive lags properties of the independent variable. Post-tests diagnostics carried out included, autocorrelation, heteroscedasticity tests and CUSUMQ tests.

3.6.1 Stationarity test

Firstly, the ADF unit root tests were used to identify the stationarity properties of time series variable. The basic formulation of the ADF was specified as equation (14) below;

$$\Delta X_t = \alpha + \partial t + \rho X_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta X_{t-1} + \varepsilon_t \tag{14}$$

Where is the difference operator, X_t denotes the series at time t. α, ∂, ρ,γ represents parameters to be estimated, ε_t stochastic error term. Therefore, the hypothesis is specified as;

$$H_0: \rho = 0; \quad H_1: \rho \neq 0$$

Decisions were made based on rejecting the null hypothesis for the value of tau or t-statistics being more negative as compared to critical values.

Secondly, the study was followed by unit root test with endogenous unknown structural test to cure for the likelihood of presence of structural breaks using Perron tests. Empirical studies show that conventional unit root test alone is insufficient and problematic since it is highly possible that could have significant breaks in the target time series variable. Two advantages of this process include avoidance of producing outcomes that are biased toward non-rejection (Phillips and Perron, 1988) and secondly, if the time of break can be identified for a specific variable, then it would be easy to investigate if the break on a certain variable is related to government policy, regime change, financial crisis or other factors. This would also ensure robustness, because the main problem with

the unit root test was decreasing low power or the ability to rejecting the null hypothesis when in actual sense being false.

The insertion of the structural break in the unit root testing allowed for both intercept and trend shift was important because it could improve the reliability of the econometric tests used and improved the accuracy of statistical inference (Ferreira, 2013).

$$\Delta X_t = \alpha + \rho X_{t-1} + \partial t + \emptyset DU_t + \sum_{i=1}^{p} \gamma_i \Delta X_{t-1} + \varepsilon_t \qquad (15)$$

Where, DU_t represents dummy DU=1, when t > breakpoint and zero otherwise and allowing a onetime variation in intercept and slope.

3.6.2 Co-integration Test

Time series study employs co-integration test to establish long run relationships. The tests are applied to identify degree of sensitivity of two variables over a specified period of time (Persaran and Shin, 1998).

3.6.3 Bounds testing ARDL approach

The bound test confirms existence of long run relationships between the variables under investigation. Unlike earlier econometric methodologies, this technique may be practised by combine I(0) and I(1) series whilst decoding coefficients that might be inconsistent and illegitimate, therefore ensuring non-existence of ambiguous outcomes after unit root checks. In addition, the approach acknowledges differences in responses of all the underlying regressors and allows varying lag-lengths for different independent variables. Accordingly, the bound test approach (Persaran and Smith, 2001) follows three steps as follows;

a) Determination of presence of long-run relations amongst variables. The decision criteria involve use of F-statistics. F-statistics is computed in which comparison of two sets of critical values given by Persaran, et al., (2001) depending on number of regressors are carried out.

b) Determination of the long run coefficients and establishing their magnitude and signs.

c) Determination of the short run coefficients of error correction representation and the co-integrating speed to equilibrium after short-term shocks.

This co-integration approach still yields excellent results with small sample datasets (Sharma et al., 2018).

The general ARDL framework, modelling specification for equation (12) adopted using appropriate lag length criteria is presented as follow;

$$\Delta DINV_t = \boldsymbol{\alpha_0} + \sum_{i=1}^{p} \boldsymbol{\alpha_1} \Delta DINV_{t-p} + \sum_{i=1}^{q} \boldsymbol{\alpha} 2 \Delta GDP_{t-q} + \sum_{t-q}^{q} \boldsymbol{\alpha} 3 \Delta PUE_{t-q} +$$

$$\sum_{i=1}^{q} \boldsymbol{\alpha} 4 \Delta CPS_{t-1} + \sum_{i=1}^{q} \boldsymbol{\alpha} 5 \Delta INF_{t-q} + \sum_{i=1}^{q} \boldsymbol{\alpha} 6 \Delta EXDT_{t-q} + \sum_{i=1}^{q} \boldsymbol{\alpha} 7 \Delta RIR_{t-q} +$$

$$\sum_{i=1}^{q} \boldsymbol{\alpha} 8 \Delta OPP_{t-q} + \boldsymbol{\beta_1} DINV_t + \boldsymbol{\beta_2} GDP_t + \boldsymbol{\beta_3} PUE_t + \boldsymbol{\beta_4} CPS_t + \boldsymbol{\beta_5} INF_t + \boldsymbol{\beta_6} EXDT_t +$$

$$\boldsymbol{\beta_7} rIR_t + \boldsymbol{\beta_8} OPP_t + \boldsymbol{\mu_t} \tag{16}$$

Where; Δ is the first deference operator; $\alpha_1 - \alpha_8$ and $\beta_1 - \beta_8$ represents short and long run elasticities respectively, $\boldsymbol{\mu}$ represents white noise error, p optimum lag length- used for independent variables. q indicates optimum lag length used for exogenous variables.

OLS is first applied to estimate equation (17) while testing for co-integration. The null hypothesised of no run relations between variables in equation (16) and then tested against the alternative hypothesis. This is specified as;

H0 : $\beta i = 0$ for; $i = 1,2,3 \dots, \dots, 8$; for no cointegration

H1: $\beta i = 1$ for; $i = 1,2,3,\dots,\dots,8$; for existence of cointegration

The order of lags of the ARDL models is selected using AIC criterion. F-statistics is computed in which a comparison of the two sets of critical values for the upper I(1) and lower 1(0) bound and are presented in Pesaran et al., (2001) depending on number of regressors' carried out. If the calculated F lies between the two bounds, the resulted are termed as inconclusive.

3.6. 4 Long run and short run effects parameter estimation

Determination of the long run coefficients is specified as;

$$\text{DINV}_t = \boldsymbol{\alpha_0} + \sum_{i=1}^{p} \boldsymbol{\alpha_1}\text{DINV}_{t-p} + \sum_{i=1}^{q} \alpha 2\text{GDP}_{t-q} + \sum_{i=1}^{q} \alpha 3\text{PUE}_{t-q} +$$

$$\sum_{i=1}^{q} \alpha 4\text{CPS}_{t-q} + \sum_{i=1}^{q} \alpha 5\text{INF}_{t-q} + \sum_{i=1}^{q} \alpha 6\text{EXDT}_{t-q} + \sum_{i=1}^{q} \alpha 7\text{rIR}_{t-q} +$$

$$\sum_{i=1}^{q} \alpha 8\text{OPP}_{t-q} + \boldsymbol{\mu_t} \qquad (17)$$

Short run coefficients are determined by estimating Error collection model (18) in case there exist a long run co-integration.

$$\Delta DINV_t = \boldsymbol{\alpha_0} + \sum_{i=0}^{p} \boldsymbol{\alpha_1} \Delta DINV_{t-p} + \sum_{i=1}^{q} \boldsymbol{\alpha_2} \Delta rGDP_{t-q} + \sum_{i=1}^{q} \boldsymbol{\alpha_3} \Delta PUE_{t-q} +$$

$$\sum_{i=1}^{q} \boldsymbol{\alpha_4} \Delta CPS_{t-q} + \sum_{i=1}^{q} \boldsymbol{\alpha} \Delta INF_{t-q} + \sum_{i=1}^{q} \boldsymbol{\alpha_6} \Delta EXDT_{t-q} + \sum_{i=1}^{q} \boldsymbol{\alpha_7} \Delta rIR_{t-q} +$$

$$\sum_{i=1}^{q} \boldsymbol{\alpha_8} \Delta OPP_{t-q} + \boldsymbol{\beta_1} DINV_t + \boldsymbol{\beta_2} rGDP_t + \boldsymbol{\beta_3} PUE_t +$$

$$\boldsymbol{\beta_4} CPS_t + \boldsymbol{\beta_5} INF_t + \boldsymbol{\beta_6} EXDT_t + \boldsymbol{\beta_7} rIR_t + \boldsymbol{\beta_8} OPP_t + \lambda ECM_{t-1} + \mu_t \quad (18)$$

Where; $\boldsymbol{\alpha_1} - \boldsymbol{\alpha_8}$ are coefficients of short-run dynamics, λ coefficient of ECM$_{t-1}$ represents adjustment speed to long run equilibrium after short term shocks; ECM$_{t-1}$ represents residual generated from the co-integration model lagged on period. The other variables are as described in previous model. ECM was estimated as below;

$$ECM_t = \Delta DINV_t - \left(\boldsymbol{\beta_0} + \boldsymbol{\beta_1} PI_t + \boldsymbol{\beta_2} rGDP_t + \boldsymbol{\beta_3} PUE_t + \right.$$

$$\left. \boldsymbol{\beta_4} CPS_t + \boldsymbol{\beta_5} INF_t + \boldsymbol{\beta_6} EXDT_t + \boldsymbol{\beta_7} rIR_t + \boldsymbol{\beta_8} OPP_t \right) \qquad (19)$$

Where ECMt represents residual from Co-integration equation and the β's are long run coefficients.

3.7 Diagnostic Tests

Various diagnostic analysis was carried out to check if prior assumptions hold in order to correct model specification that are inconsistent and unbiased estimates of the population.

The tests includes serial correlation that could lead to biased estimates resulting from lags of dependent variable in the equation. Similarly, Heteroscedasticity test (Breusch-Pagan Test and

normality test (Jarque –Bera test) were conducted including Ramsey RESET test for omitted variables bias to ascertain both consistent and efficient of the estimates. Consequently, the CUSUM and CUSUMSQ are plotted against break's points. The null hypothesis of stable coefficients in the given regressing is accepted if plotted statistics lies within the critical bound at five percent significance.

3.8 Data Sources

Kenya annual time series data obtained from secondary sources for econometric analysis from 1975 – 2018. The data on Eight the macroeconomic variables was acquired from online portal for the IMF database, the World Bank database and various economic survey reports from KNBS.

CHAPTER FOUR
RESULTS AND DISCUSSIONS

4.1 Introduction

Empirical findings, descriptive analysis, stationarity test results, cointegration results, long-run and shortrun ARDL results of variables under study determining domestic investment decisions in Kenya are reported. The discussions of the results based on the research hypothesis.

4.2 Empirical findings

4.2.1 The Data

Consistent with theoretical and conceptual framework presented under chapter three, analysis of macroeconomic variables affecting domestic investments in Kenya are analysed taking into consideration properties of time series. We include yearly series of Kenya domestic investment (DINV), annual growth rate (GDP), Public Expenditure (PUE), credit to private sector (CPS), inflations (INF), external debts EXDT, interest rates (RIR) trade openness (OPN) and real exchange rate (EXCH) from 1975 to 2018.

4.2.2 Descriptive Analysis

Table 1: Shows results of the analysed variable under research. The results show that the Kenyan Domestic investment mean of 20.2, standard deviation of 3.23 with maximum of 29.95 and minimum of 15.00. GDP annual growth had a mean 4.1 and standard deviation 2.48, maximum 9.45, minimum value of -0.79.

Openness reports a mean of 56.02 percent, standard deviation of 8.29 %, Maximum 72.85, minimum 36.18. Official Real exchange rate shows a mean of 51.34 standard deviation of 33.20 maximum of 103.4 and minimum of 7.3. Credit to private sector reported a mean 23.70 standard deviation of 4.76, maximum and minimum values of 34.24 and 16.82 respectively. Real interests rates had a mean of 6.72 Standard deviation of 6.82, maximum and minimum 21.10 and -8.00 respectively.

Inflation had maximum of 41.98 minimum of 0.93, mean of 10.43 and a standard deviation of 7.28. Public Expenditure had a mean 22.08, standard deviation of 2.33, maximum and minimum of 27.19 and 18.27 respectively. External debts had a mean 51.18 standard deviation, 24.66 maximum and minimum 131.89 and 21.38 respectively for the period under study.

Table 1: Descriptive Statistics

	DINV	GDP	PUE	INFR	RIR	CPS	EXT	OPN	EXCH
Mean	20.2	4.1	22.0	10.4	6.7	23.7	51.1	0.5	51.3
Median	19.9	4.3	21.4	9.6	6.2	22.9	46.1	0.5	58.3
Max	29.7	9.4	27.1	41.9	21.1	34.2	131.8	0.7	103.4
Min	15.0	-0.7	18.2	0.9	-8.0	16.8	21.3	0.3	7.3
Std. dev	3.2	2.4	2.3	7.2	6.8	4.7	24.6	0.08	33.2
OBS	44	44	44	44	44	44	44	44	44

Source: Author's analysis, EViews10

4.2.3 The Stationary Tests Results

The results presented in Table 2 ADF unit root results with intercepts and no trend. Rejection of null hypothesis is based on probability p-value. All variables were rejected at 5% significance.

Table 2: ADF Unit Root Results

Intercepts and no trend

	Level		1st difference		I (d)
Variable	t- statistics	P-value	t-statistics	P-value	Order
DINV	-3.57**	0.01	-	-	$I(0)$
GDP	-3.84**	0.00	-	-	$I(0)$
PUE	-1.178	0.68	-5.81**	0.00	$I(1)$
INF	-4.920**	0.00	-	-	$I(0)$
RIR	-4.571**	0.00	-	-	$I(0)$
CPS	-1.614	0.47	-7.58**	0.00	$I(1)$
OPN	-2.660	0.08	-6.73**	0.00	$I(1)$

EXTD	-1.393	0.58	-6.64**	0.00	$I(1)$
EXCH	-0.157	0.94	-6.01**	0.00	$I(1)$

Rejected null hypothesis at **5% significant level; (d) represent order of integration; Source: Author's analysis, EViews10

The PUE, CPS, OPN, EXDT and Exchange rate become stationary (does not have unit root) at first difference. DINV, the dependent variable, along with regressors GDP, Inflation and Interest rates rejection of null hypothesis of presence of unit root at level.

The findings confirm I(0) variable for DINV the dependent variable, along with regressors GDP, Inflation and Interest rates with t-statistics values significant at five percent critical value. PUE, CPS, OPN, EXDT and Real Exchange rate variables were integrated at first deference I (1) and t-statistics significant at five percent critical level.

The presence of I(0) and I(1) within set of regressor implies use of ARDL Bound test for co-integration (pesaran *et al.,*2001) as opposed to co-integration method by Johansen (1998) applied for only I (1) variable and hence appropriate to model the sets of variables. Additionally, the ADF test reveals absence I(2) on regressors and that the dependent variable was I(0). Test results also confirm non-existence of I(2) variable or above and hence ARDL procedure was deemed applicable for model estimation.

Results for structural breaks at level for all variables demonstrate insignificant t-statistics at five percent confirming absence of significant structural break for the selected macroeconomic variables under study.

4.2.4 Bound testing for co-integration

The process involves testing for co-integration in equation (18) using equation (19). A maximum of one lag (based of AIC) was used in bound testing of the annual time series. This was followed by computation of F-statistics. The upper and lower critical values were compared to make final judgement.

Table 3, presents results for bound tests process. The Joint null hypothesis of lagged level variables of the coefficient of zero cointegration was rejected at 5% significance level. The calculated F-Statistics 6.7579 ($F_{dpinvest}$(.) = 6.7579) exceeds the upper bound critical value 3.61 at 5% significance level. The null hypothesis of no cointegration between domestic investment and macroeconomic variables was rejected at 5% significant level hence confirming co-integration.

Table 3: Bound test

Bound tests		
Test statistics Asymptotic: n =1000	**Value**	**Lag K= 8**
F-statistic computed	6.7579**	
Critical values Bound	Pesaran *et al.,* (2001)	
Significance	I (0) bound	I (1) bound
10%	1.76	2.77
5%	2.04	2.08
1%	2.5	3.68

Note: (**) denote tests at 5% significant level;   K= number of regressors

Source: Author's analysis, EViews10

4.2.5 The Long run coefficients estimation results

As predicted, majority of the estimated parameters had their expected theoretically hypothesised signs despite not all were statistically significant. Again, the findings revealed that GDP, government expenditure, trade openness and exchange rates had long run significant effects on domestic investment at an aggregate level during the period 1975 to 2018. Table 4.1 show the estimated results for the long run coefficients from ARDL model.

These findings infers that over the longrun, a nit increases in GDP of aggregate demand conditions is potentially critical in stimulating domestic investments in Kenya and leads to 0.83 increase in domestic investments. This result confirms many empirical literature including studies by Emeka and Aham (2016), Frimpong et al., (2010) among other studies.

Table 4.1: Long run coefficient estimation results

ARDL 1,1,0,1,1,1,0 selection base on AIC;		Response variable: DINV		
Variable	Coefficient	Std. error	t-statistics	P-value
CONSTANT	18.68	4.72	3.95	0.00*
DINV(-1)	-0.31	0.16	-7.95	0.00*
GDP (-1)	0.83	0.21	3.92	0.00*
PUE	0.77	0.30	2.57	0.01*
CPS (-1)	0.35	0.21	-1.64	0.11
INFR (-1)	-0.06	0.08	0.72	0.47
EXDT (-1)	-0.003	0.02	-0.12	0.90
RIR	0.06	0.06	0.98	0.03**
OPN (-1)	-0.01	0.02	-0.67	0.05**
EXCH	-0.06	0.03	-2.04	0.05**

(*), (**) respectively significant level of 1% and 5%
Source: Author, Eviews10 analysis

Government Expenditure had positive and significant coefficient (0.77). This confirms possible crowing in complementarity association of government spending on domestic investments. This indicates that increases in government expenditure increases domestic investment. This confirms empirical study done by Kazeem and Olukemi (2012), King'wara (2014) and Acosta (2005).

Credit to private sector had appropriate positive signs as theory predicts but statistically insignificant coefficient. Empirical literature confirms that availability of credit is the major constraint facing the domestic investment in developing countries. The insignificant coefficients in the case of Kenya may be explained by credit being scarcity given to potential viable businesses over the past years.

Inflation variable coefficients (-0.06) had appropriate negative sign although insignificant consistent with theoretical proposition that high inflation results to instability of the macro-

economic variables and hence hinders domestic investment in the economy. These results are consistent with moss empirical studies like Ndanu, (2018) and Kingori (2015) for the Kenya. However, it contradicts Acosta (2005) for Argentina case and Konor (2016) for Ghana case where inflation was found to stimulate domestic investment.

Real interest rates had interestingly positive sign and significant coefficient. The results contrast flexible accelerator assertions of negative effect of user cost of capital on investments. However, it confirms Mackinnon and Shaw (1973) "complementarity" hypothesis argument on the boost to savings that leads to increase in bank credit which consequently raised investment. The result implies that a one percentage rise in interest rates would boost investments by 6 percent. The result contrasts empirical findings carried out elsewhere but confirms Mbaye (2014) for Kenya scenario and Ouattara (2004) for Senegal.

Again, results of stock of external debts ratio had a negative sign consistent with the hypothesis of debt burden effect on domestic investment although the coefficient was insignificant. This implies that external debts affect domestic investments decisions in Kenya. This result corroborates several studies in developing countries particularly Sub-Saharan Africa Ngoma and Nyoni (2019), King'wara (2014) for Kenya and Ferreira and Tasso (2013) for Brazil case.

Exchange rate parameter had expected negative sign and significant at 5% level. This infers that depreciation of shilling in Kenya scenario has been able to stimulate export and imports substituting industries. The sign was negative as postulated by the theory. These results are consistent with Fimpong (2010) for Ghana, Kingori, 2015 for Kenya and Ngoma (2019) for Sub-Saharan Africa.

The result for the openness of the economy had negative sign and statistical significant coefficient. The implies that percentage increase in the openness tends to decrease domestic investment by 10 percent. The implication is that opening the economy for external competition through trade liberation adversely affects domestic investments over the longrun. The trade liberation policies may have affected the development of Kenya's industries and investments.

4.2.6 The shortrun estimation results

The shortrun parameter estimations were done after estimation of the long-run cointegration mode. Therefore, lagged values of all the level variables, a liner combination denoted by error correction term (ECM$_{t-1}$) retained. Table 4.2 reports results of estimated ECM of domestic investment for Kenya using ARDL approach.

Table 4.2: Short run estimation findings

Short-run Coefficients (ARDL (1,1,0,1,1,1,0,1,0 AIC selection) Response: DINV				
Variables	Coefficient	Std. error	t-statistics	p-value
Δ (GDP)	0.53	0.17	3.00	0.00*
Δ (CPS)	0.21	0.22	0.93	0.35
Δ (INFL)	0.006	0.06	0.10	0.91
Δ (EXDT)	0.12	0.06	1.97	0.05**
Δ (OPN)	-0.06	0.02	-2.35	0.02**
ECM (-1)	-0.76	0.13	-9.99	0.00*
ECM = DINV − (0.63 GDP+ 0.59PUE - 0.26 CPS - 0.04 INFR − 0.006 EXDT + 0.04 RIR - 0.01 OPN -0.04EXCH + 14.17)				
R-squared	0.78	Mean dependent var	0.00	
Adjusted R-squired	0.74	SD. Dependent var	3.17	
S.E of regression	0.61	Akaike Info Criterion	3.96	
Sum squired residual	91.03	Schwarz Criterion	4.28	
Log likelihood	-77.62	Hannan-Quinn criteria	4.08	
		Durbin-Watson Stats	2.27	

(*), (**) respectively 1% and 5% significance   Source: Author, estimation outputs, EViews10

The Domestic Investment estimated ARDL (1,1,0,1,1,1,0,1,0) model is therefore represented as;

$$\Delta DINV = -0.31DINV(-1) + 0.83GDP(-1) + 0.35CPS(-1) + -0.06INFL(-1) - 0.003EXDT(-1) + 0.6RIR - 0.01OPN(-1) - 0.06EXCH + 0.53\Delta GDP + 0.21\Delta CPS + 0.006\Delta INFL + 0.12\Delta EXTD - 0.06\Delta OPN - 0.76 ECM(-1) + 18.68 \qquad (20)$$

GDP, External public debts and openness revealed short run significant effects on domestic investment rate at 5% level. In addition, over the short run, availability of domestic credit and inflation are statistically insignificant in defining domestic investments.

In specific, the results confirms flexible accelerator theory application on domestic investment in Kenya both over the shortrun and longrun at aggregate level. Therefore, GDP would be a powerful investment accelerator in the both scenario. The positive outcomes are consistent with most finding undertaken both in developed and developing economies. Specifically, it concurs with Acosta (2005), Sam et. al.,(2018), and Adel (2015).

Again, a one percent rise in external debts level would lead to 12 percent increase in domestic investments rate. This is consistent with long run effects confirming a possible complementarity effect of external debts on domestic investment. The results interestingly confirm expected predicted positive sign of the variables. This indicates that an increase in external debts levels increases domestic investment again confirming the empirical study done by Fringpong (2010) and Mbaye (2014) although contrast finding by Acosta (2005) that external debts adversely affects domestic investments in an economy.

The coefficients of availability of credit had appropriate expected positive sign as predicted but insignificant. A percentage increase in availability of private sector would lead to 21 percent increases in domestic investments but insignificant. These finding are consistent with flexible accelerator theory.

The exchange rate had negative effects on domestic investments over the shortrun consistent with prior expectation. The negative parameter portrays that appreciation of exchange rates inhibits domestic investments in Kenya, that is, a percentage rise in real exchange rates would result tp -0.15 contraction of domestic investments. The results are consistent with previous findings by Mbaye, (2014) and Kingori, (2015) for Kenya. The implications are that depreciation of the shilling would stimulate domestic investment for exportable and import substituting investments.

The results again clearly show that trade openness had significant negative short-term influence on domestic investment. The excessive exposure of domestic economy to foreign competition as a result of trade liberalization poses adverse effects on both longer and shortterm investments. This may have affected non-tradable sector (not exportable) of the economy.

Again, contrary to the long run findings, interest rates indicated positive results in the shortterm. These outcomes are interestingly different from the expected sign since neoclassical theory predicts negative relationship between the variables. The implication is increases in real interests rates by 1% increases domestic investments by 10 percent. This seems to be spurring domestic investment through increased savings. The results contrast several empirical studies by Acosta (2005) and Sharma (2018) for Mauritius and others.

Again, contrary to the long run, inflations, capturing macroeconomic instability, indicated positive results in the shortrun. These outcomes were interestingly different to the expected sign since flexible accelerator theory predicts negative relationship between the variables. However, the findings were consistent with Acosta (2005) for Brazil case. The implication is increases in inflation would lead to investors increasing outputs resulting from increasing prices of goods and services taking advantage of high prices and productivity in the economy.

In addition, the results show that Durbin-Watsons statistics of 2.39 greater than required two hence significant implying absent of serial correlation in the model. The diagnostic tests for model show R- squired value of ARDL was 0.77. This shows the model fit reasonably well.

4.2.7 Diagnostics and Stability tests results

Diagnostic tests concerning behaviour of error term and model specification are shown in Table 5.

Table 5: Diagnostics tests results

Diagnostic type	Methods	F-statistics	P-values
Error term diagnostics			
Normality	Jarque Bera tests	2.12	0.34
Serial correlation	Breusch-Godfrey LM test	1.14	0.33
Heteroskedasticity	Breusch Pagan tests	1.16	0.35
Model specifications diagnostics			
Omitted variables bias	Ramsey RESET test	1.314	0.26

*test significant at 5% critical value

Source: Author's Analysis, Eviews10

The serial correlation that would lead to biased estimates as a result of presence of lags of the dependent variables in the equation and that Breusch-Godfrey LM tests with null hypothesis of no serial correlation up to 2 lags was rejected (F-stat 1.1413 at P- 0.3361). Similarly, Heteroscedasticity test (Breusch-Pagan Test (F-stat 1.16 at probability 0.35 and normality test (Jarque –Bera test-2.125 p 0.34, Kurtosis 3.8 and skewness -0.35) hypothesis are rejected.

Ramsey RESET test for omitted variables bias was rejected (F-1.314 p 0.26) so specification error and the estimates are both consistent and efficient *ceteris paribus.*

Stability diagnostics

Figure 2 and Figure 3 shows result for the Cummulative Sum (CUSUM) and Cummulative Sum Squires (CUSUMQ) stability diagnostics analyse coeffecents following Pesaran and Pesaran 2001 process.

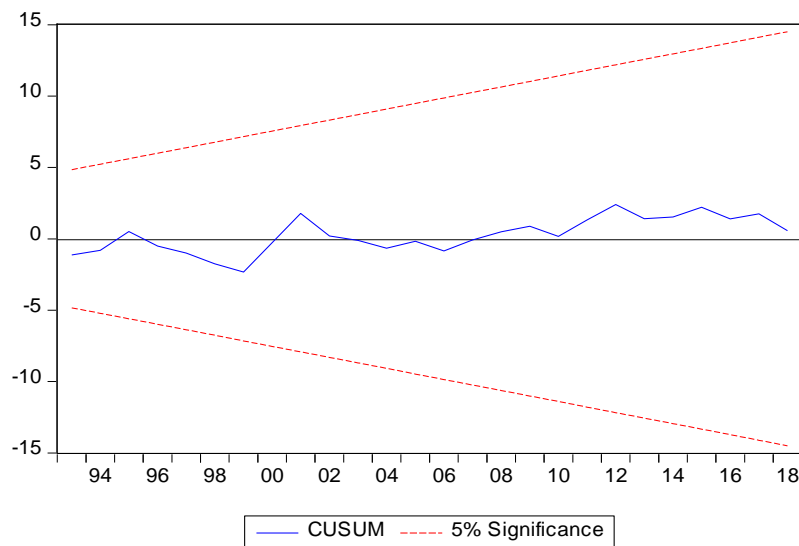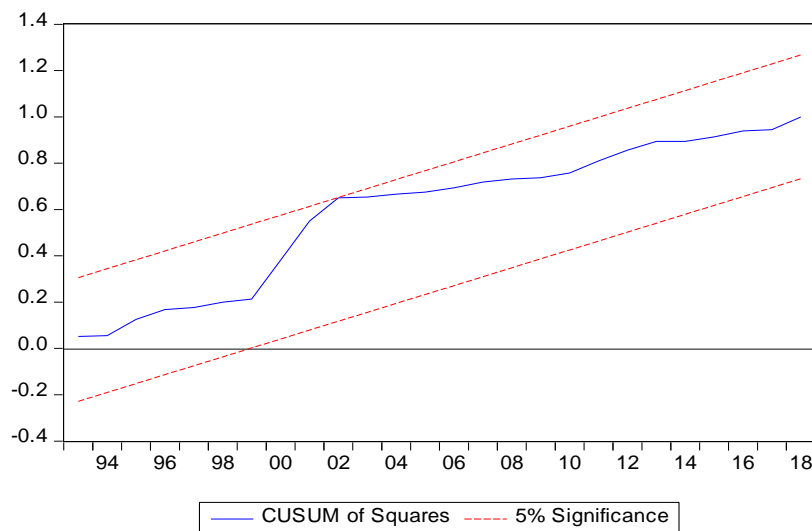Figure 2: Plot of Cummulative Sum

Figure 3: Plot of Cummulative Sum Squares

Source: Author, analysis, EViews10

Finally, consistent with Pesaran et al., (2001) results for CUSUM and CUSUMQ, the results demonstrates that residuals are within 5 percent critical bound implyinng steadiness of the parameter lays within the crtical bound of stability and hence does not show evidence of statistically significant breaks. This confirm the stability of domestic investment model.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter reports research summaries, conclusions, recommendation and proposes areas for further study.

5.2 Summary and conclusions

The research study investigated shortrun and longrun effects of macroeconomic variables that affects performance of domestic investment using Kenya time series data set from 1975 - 2018. Rationale for the study derived from understanding that macroeconomic factor variabilities influence domestic investment decisions who have been the key driver of growth for countries over decades. The study examined the behavior of time series macroeconomic variables employing ARDL approach and the behaviour for the last four decades was established.

The study found that GDP annual growth rate, government expenditure, openness, External public Debts levels and real exchange rate were the main macroeconomic variables that significantly affect domestic investment. However, domestic credits, inflation and interest rates failed to significantly impact domestic investments in the shortrun as expected.

The shortrun estimation revealed adjustment speed to longrun equilibrium aftershocks in the economy was -76% and statistically significant t-statistics at 1%. The results implies that deviations from the previous period are corrected at 76% speed in the current year and in consequent, it would take approximately one and half year to converge to clear all shocks. The value of coefficient is between 0 and -1 and signifies that the relationship is not explosive and thus can be predicted.

The diagnostics tests result that the model passed the tests for heteroscedasticity, serial correlations, normality and model specifications. The CUSUM and CUSUMQ results demonstrated that residuals were within 5 percent critical bound implying stability of the parameter remained within

the critical bound and hence does not show evidence of statistically significant breaks. This confirms the stability of domestic investment function.

Moreover, exploration of the domestic investment model indicates the independent variables are the mains policy instruments by Government, it emerges that accelerating domestic investments would mean as follows: increasing the economic activities (outputs); boosting the amount of external concessional credit with long tenure, and, raising investments in public goods in Kenya over the long-run. Conversely, measures geared toward devaluation of exchange rates, or austerity measures on public expenditure are unfavourable in the domestic investment growth in an economy.

Finally, the findings may be subject to measurement errors and repeat of the same process using additional variables may complement this study.

5.3 Policy Recommendations

Taking into consideration research results, the paper recommends policy interventions as follows; Firstly, the government should formulate and implement appropriate policy geared toward ensuring macroeconomic stability to stimulate economic growth increase by maintaining stable macroeconomic variables. Again, in order to ensure increased domestic investments in the domestic economy, the Government should put measure to maintain stable interest rate regime at lower affordable levels so as to improve access by the domestic investors. Further, appropriate policies should be put in place geared toward achieving stable exchange rates and increased availability of credit. Again, interest rates stability should be maintained at stable state through ensuring moderately lower levels in accordance with Tobin arguments for increased domestic investment.

Finally, the research recommends effective formulating and implementing of credible macroeconomic policies to stimulate capital formation and improve domestic investments.

5.4 Study Limitations

The study adopted an aggregate approach in its investigation of selected macroeconomic variable affecting domestic investment in the short and longrun. Other variables are excluded in the study such as political uncertainty, infrastructural, legal and regulatory, governance, and technological variables in order to narrow the research to manageable scope due to time constraints and resources limitation. In addition, unavailability of specific firm data on private sector investments had limitations to this study.

5.5 Area of further research

Direction of future researches may focus on domestic investment determinants covering wider time frame. Again, the researcher recommends specific focused research on each variable would more expect varying results. Other areas of research are on the effects of taxation, legal and regulatory institutions, governance and political governance on domestic investment in Kenya economy.

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