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The impact of cash management and other determinants on short term domestic debt in Kenya.

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THE IMPACT OF CASH MANAGEMENT AND OTHER DETERMINANTS ON SHORT TERM DOMESTIC DEBT IN KENYA

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A DISSERTATION SUBMITTED TO STRATHMORE UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF MASTERS IN PUBLIC POLICY AND MANAGEMENT

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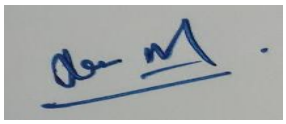
ABSTRACT

This research sought to determine the impact of the Kenya's National Treasury cash management policy being implemented by the National Government on the short-term domestic debt. It also sought to analyze other determinants of short-term domestic debt. Using a time series monthly data from January 2010 to June 2019, and a dummy variable to differentiate the period when the cash management policy was introduced and implemented (one,1) and the period before it was implemented (zero,0), results of stationarity dictated the use of Autoregressive Distributive Lag Bound Test model as the variables of interest were either integrated of order zero, I(0) or order one, I(1). We also carried diagnostic and stability tests which confirmed no serial correlation in the series as well as stability of the model. The results show that over the period of analysis, the average bank overdraft has been Kshs27.11B; total cash holdings, Kshs191.98B; exchange rate stood at Kshs92.59 per US dollar; GDP growth rate was 5.14%; inflation rate, 7.25%; interest rate, 15.64% and treasury bills stood at an average of Kshs 376.78B. The ARDL Bound Test confirmed the existence of cointegration when bank overdraft was used as the dependence variable implying existence of long run relationship, further justifying the use of restricted Error Correction Model (ECM). The evidence in this study supports the view that in the long run, previous and current cash management affects bank overdraft positively while previous and current exchange rate affects bank overdraft negatively. In the short-run dynamics, previous and current cash management, inflation and exchange rate affects short-term debts in Kenya. As depicted by these results, past data and behaviors in dealing with interest rates, cash management, inflation and treasury bill affect current short-term debt. The dummy variable is found to be significant and has a positive coefficient with the two measures of short-term debt, implying that introduction of cash management policy by the National Treasury plays a vital role in the management of short-term debts in Kenya. The higher the amount of the idle cash held by national and county government, the higher the appetite for short term-debts. The error correction term (ECT) illustrating the speed of adjustment has a coefficient of 0.60 implying that there is about 60% feedback from the previous period into the short run dynamic process. In terms of policy recommendation, the National Treasury's objective of Cash Management implementation should be encouraged with focus on mopping idle cash held at end of day by MDAs; and continued macroeconomic stability pursuit by ensuring stability in the interest, inflation and exchange rates.

DECLARATION

This dissertation is my original work and has not been presented for a degree in any other university.



May 21, 2020

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This research paper has been submitted for examination with my approval as University Supervisor.

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DATE 21st May, 2020

DEDICATION

This dissertation is dedicated to my family who have had to contend with my absence in order to complete my studies in enhancement of my professional standing.

ACKNOWLEDGMENT

The writing of this dissertation is assumed to be an individual's effort. However, the work that goes into it to meet the required rigor of a master's level degree for examination by Strathmore University Business School is quite a collaborative effort. First and foremost, I wish to thank the Almighty God for seeing me through this academic journey and for giving me good health. I am greatly indebted to my supervisor, Prof. Kibua and the faculty who made the research work a real learning process through their valuable but firm comments, advice and guidance.

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Despite the support received from the above-named persons, I solely remain responsible for any errors and omissions in this paper.

LIST OF ABBREVIATIONS

ARDL	Autoregressive Distributive Lag (ARDL)
BP	Budget Policy Framework
ADF	Augmented Dickey Fuller
CBK	Central Bank of Kenya
CM	Cash Management
DD	Short-term Domestic Debt
EA	Exchequer Account
ECM	Error Correction Model
FD	Fiscal Deficit
FMS	Financial Management Systems
GDP	Gross Domestic Product
IFMIS	Integrated Financial Management System
Kshs	Kenya Shillings
MB	MDA Budgets
MDA	Ministries, Departments and Government Agencies
MPA	MDA Payment Accounts
NT	National Treasury
OD	CBK Bank Overdraft
OECD	Organization for Economic Cooperation and Development
OR	Ordinary Revenue Outturn
PEFA	Public Expenditure and Financial Accountability
PFM	Public Finance Management
PFMR	Public Finance Management Reforms
PP	Phillip Pheron
TB	Treasury Bills
TFA	Treasury Funding Account
TSA	Treasury Single Account
VAR	Vector Auto Regressive
VECM	Vector Error Correlation Mode

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CHAPTER ONE

INTRODUCTION

1.1 Background Introduction

Government expenses are financed differently. Generally, in most countries, these expenditures are financed through taxes, charges, compulsory contributions to social security and other government facilities, proceeds from its private sector activities, shares in companies, profits transferred from the central bank, income from privatization among others (World Bank, 2016). While it is desirable to finance whole expenditure through the revenues generated, in most cases, particularly in developing countries like Kenya, the government expenditure is usually higher than the revenues collected resulting into budget deficit. Thus, securing internal or external debt becomes inevitable to bridge the budget deficit (Onogbosele et., al 2016).

The increase in borrowing requirements to finance major capital investments in Kenya has put pressure on the government to consider domestic borrowing as one of the major sources of financing (Ryan et al., 2014). This is coupled with rising government expenditures in relation to falling government revenues. Data available from the Central Bank of Kenya (Central Bank of Kenya, 2018) for the period between 2000 and 2017 shows an overall rise of the public domestic debt as a percent of GDP from 1.6% to 5.53%. Fiscal deficit statistics for the same period indicate an increase in demand for government borrowing with the fiscal deficit averaging 2.3% between the year 2000 and 2008, and 6.8% between the year 2009 and 2017 (National Treasury, 2017). This increase is not unique to Kenya but compares well with Sub-Sahara African countries. In support of domestic borrowing, Onogbosele et al (2016) argues that domestic debt plays an important role in the economic growth of growing economies.

Debt management has become a vital policy focus. Kenya has over the years developed structures necessary to prudently manage its growing debt portfolio. In addition to developing the Medium-Term Debt Strategy (MTDS), internally, the National Treasury has initiated Cash Management as a policy issue. According to World Bank (2014), cash management is the strategy and associated processes for managing cost-effectively the government's short-term cash flows and cash balances both within government, and between government and other sectors.

According to the bank government Cash management takes traditional and modern view approaches. Traditional view of cash management is described as passive and is concerned about monitoring cash balances, maintaining cash buffer to handle both volatility and unanticipated outflows while the modern view is more active approach concerned with trying to smooth weekly or daily cash flow by more active borrowing and lending in money market. Good international cash management practice is characterized by efficient internal payment processing; account aggregation and minimization of idle balances; internal systems to forecast receipts and payments, and hence the government treasury funding account at the central bank, agreements between the government and central bank that cover integration of and co-ordination of government debt and cash management functions, the use of short-term borrowing instruments to help manage the timing mismatch between inflows and outflows, and efficient infrastructure for payment and settlement, with securities typically being held in dematerialized form.

Many developing countries have largely been concerned with the management of public debt while ignoring cash management that is also a critical component of public debt (Williams, 2004). Consequently, cash management as a policy area continues to lag behind in the developing countries leading these countries to concentrate on the use of cash rationings in their fiscal implementation.

According to Williams (2010) cash rationing has been found to impact negatively on the development agenda since it involves scaling down development budgets implementation coupled with unnecessary borrowing in order to cushion both the short and long term government cash requirements. Earlier study by Stasavage et al., 2000 showed that countries that have a functional cash management policy either in terms of cash budgets policy or deliberate cash management interventions overtime narrow their annual fiscal deficits and reduce their monetary financing that lead to lower inflation.

The National Treasury 2012 PEFA assessment report showed that in Kenya, commitments to monetary control systems are based on approved budgets rather than on projected cash availability (National Treasury 2016). According to the report, the numerous unsynchronized government bank accounts held in commercial banks contribute to the cash management challenges by the National Treasury. Real time cash balances available on these bank accounts is not readily available to the National Treasury. Similarly, the National Treasury is not able to recall idle balances once issued to the Ministries, Departments and Agencies (MDA). The lack of this synchronized information poses a challenge in the determination of the optimal cash balance by the National Treasury.

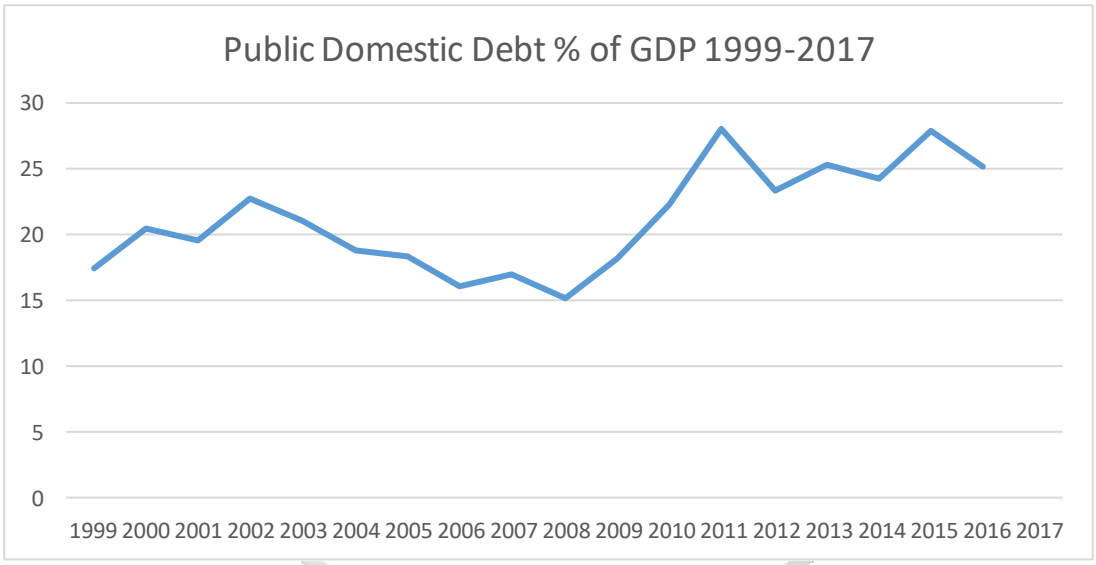
Beginning the year 2006, the National Treasury has been conducting Public Finance Management Reforms (PFMR) (National Treasury, (2016) focusing on the areas of Public Financial Management Systems (FMS), capacity building of the public finance management officers including the budget making process and reporting, strengthening of tax administration and the audit and oversight functions. In all these reforms and efforts, the Cash Management function, a key Treasury operational function in the budgetary execution, has largely been given little attention However, the National Treasury strategic plan of 2013-2018 took cognizance of this key policy issue and incorporated cash management as a key component of its strategic goal number three. Under this goal, cash management is

expected to enhance the management of the government's finances efficiently and effectively in order for the government to be able to fund expenditure in a timely manner and meet its obligations as they fall due (Strategic Plan 2013-18). This led to the introduction of cash management policy interventions in 2013.

Ian (2009), postulates that the establishment of the Treasury Single Account (TSA) is key among the six fundamental features in dealing with the developing countries cash management challenges. In line with this, the Public Finance Management (PFM) Act, 2012 provides for the establishment of a Treasury Single Account (TSA). Subsequently, since 2013, the National Treasury has embarked on a phased implementation of the TSA as a cash management tool. The TSA as a cash management tool is geared towards facilitation of the cash management objectives, that according to Ian, (2009) are ensuring adequate cash availability in the payment of expenditures when they fall due, borrowing when necessary, maximization of the returns on idle cash and the management of risks through investing temporary surpluses productively.

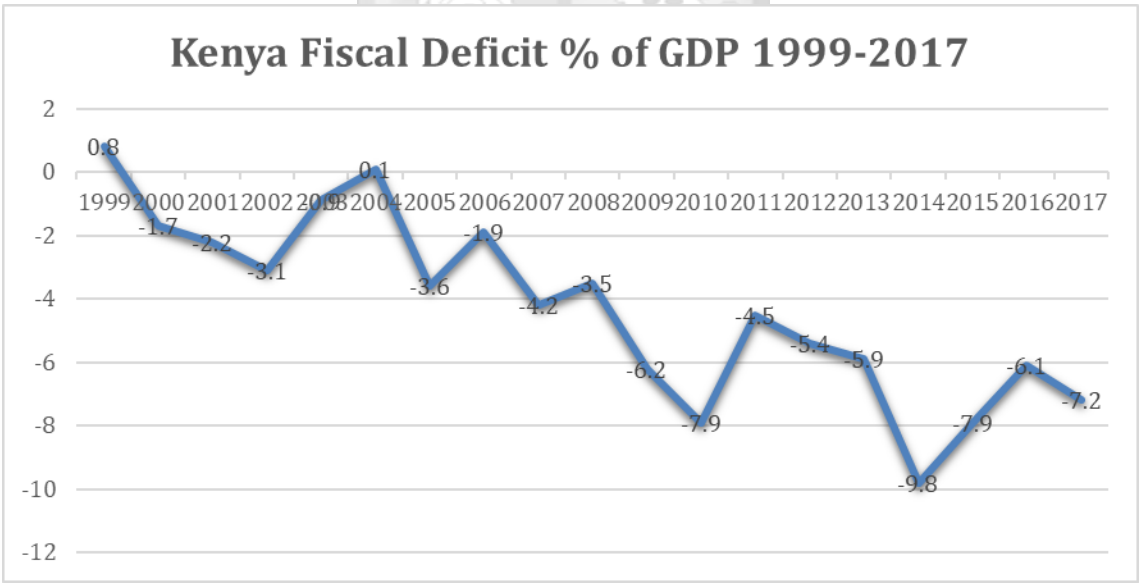
Currently, to finance budget deficit, the NT uses CBK bank overdraft facility and the short-term domestic borrowings. Where ordinary revenue is not adequate to meet the retirement of these facilities, roll overs using longer term maturity debt and new debt is usually applied in order to fill in the financing gap. Available evidence shows that there is increasing domestic debt. This is related to a broadening fiscal deficit overtime (see figures below).

Figure 1.1: Public domestic debt as a percentage of GDP in Kenya



Source: (National Treasury, 2017)

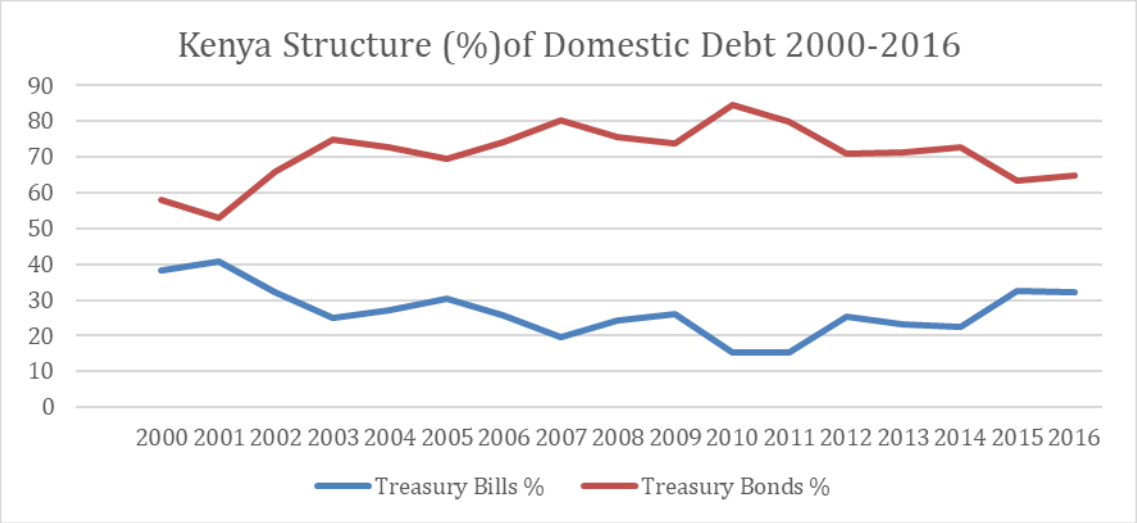
Figure 1.2 Kenya's fiscal deficit as a percentage of GDP in Kenya



Source: (National Treasury, 2017)

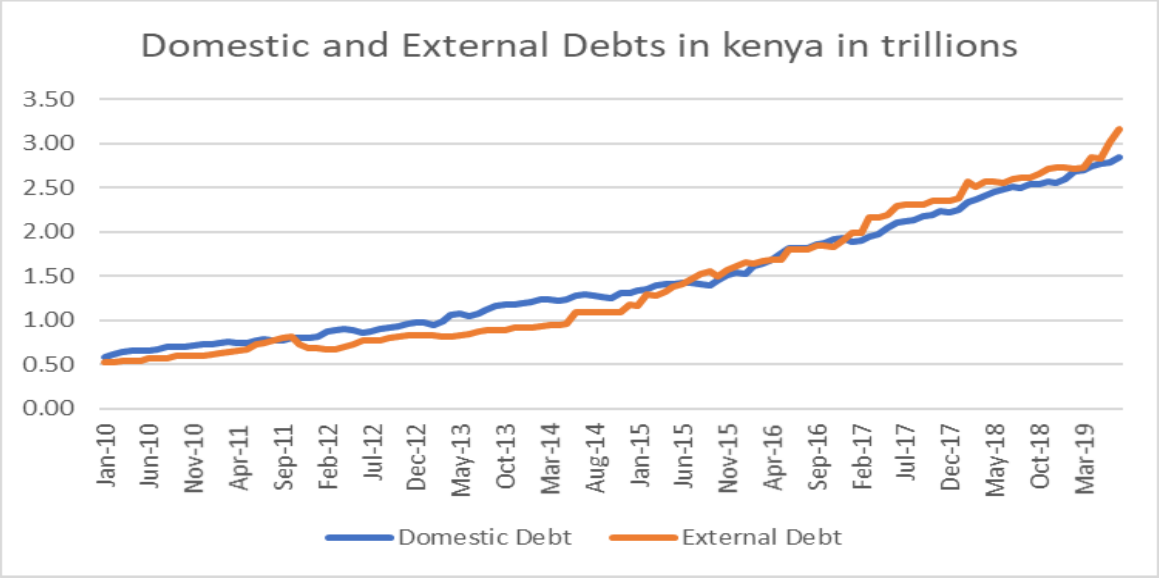
The structure of the domestic debt for the same period (figure 1.3 below) also shows a pattern whereby in the absence applying long term public debt to finance fiscal deficit, short term maturity bills are applied to finance the gap. Figure 1.3 shows graphical representation of this pattern.

Figure 1.3 Structure of Kenya's domestic debt



Source: (National Treasury, 2017)

Figure 1.4 Domestic & External debts - January 2010 to June 2019 in Trillions



Source: (Central Bank of Kenya, 2020)

Since the implementation of cash management policy in 2013, no effort (in our knowledge) has been made to investigate how the cash management policy is contributing to short term debt management. Therefore, this study looks at the impact of the Cash Management proxied by the idle balances held by the government in CBK bank accounts on short term domestic debt performance (measured by treasury bills and bank overdraft) that is currently

being implemented by the National Treasury (NT). The study also investigates other determinants on short term domestic debt in Kenya.

1.1.1 Brief Information about Kenya's cash Management

In the fiscal year ending June 2008, (Allan & Mohan, 2009) observe that the idle balances held by the government in the MDAs CBK bank accounts was on average Kshs 37.6 billion and Kshs 20 billion for the two analyzed commercial banks against the National Treasury (NT) overdraft with Central Bank of Kenya of Kshs 15 billion. In order to finance short term cash requirement shortfalls for that period, the National Treasury therefore maintained an unnecessary government overdraft facility with the CBK of Kshs 15 billion against the available excess liquidity of Kshs 22.6 billion. The financial regulations require that short term financing in the form of government overdraft be retired fully at the end of the fiscal year. With constraining outturn of ordinary revenue and an absence of deliberate cash management practices at the National Treasury, this deficit financing will usually be financed using roll overs to longer term maturity debts such as the Treasury Bonds and new borrowings of short term debt.

According to the published exchequer account for the fiscal year 2015/16, the cost of government utilization of bank overdraft as a cash management tool stood at about Kshs 17.6 billion within an overdraft facility of Kshs 46.8 billion. This translated to Kshs 64.4 billion of cash management facility due for retirement at the end of the fiscal year. This is against the backdrop that the MDA's are now required by law not to maintain idle balances in their funding accounts at the CBK unlike the periods before the commencement of the Public Finance Management Act, 2015 regulations when cumulating idle balances by the MDA's was allowable. Prior to the coming into effect of the Public Finance Management Act, 2015 regulations, the budget funding to the MDA's by the National Treasury was conducted spontaneously. The MDA's were funded based on their unjustified requests, with

a lot of discretion being given to the funding office. There was a lack of institutionalized mechanisms on the funding system. Furthermore, the oversight role of the Auditor General as the Controller of Budget was weak given that he was also charged with the approval of funding to the MDA's from the Exchequer account in addition to his statutory responsibility as the auditor of the same account. The MDA's on the other hand, were allowed to accumulate idle cash balances in their respective bank accounts once issued from the National Exchequer, to the end of the fiscal year. The MDA's would continue requesting the National Treasury (NT) for further exchequer funding despite them having positive and sometimes enough cash balances in their bank accounts to meet their short-term cash requirements.

In Kenya, the net balance of all the government bank accounts has always been positive and substantial prior the year 2009 (Allan & Mohan, 2009). This is against the backdrop of the government having maintained an average annual overdraft facility of Kshs15 billion for liquidity financing for the same period suggest an existence of a cash management gap giving rise to unnecessary short-term borrowings without factoring interest on overdraft. The excess liquidity accumulated by the MDA's in their commercial bank is indirectly applied by the banks in buying government securities whenever the NT is faced with short term cash deficit. This translates in to government borrowing its own money, with interest on borrowings being a cost on its own money. Accumulation of unmet government obligations in the form of pending bills at the end of the fiscal year means availability of following fiscal year's funding that includes costs of delayed payments and delay in budget implementation. According to the Controller of the budget the cumulative pending bills for the forty-two MDA's as at the end of 2015 was Kshs 112 billion.

Because of poor cash management practices coupled with revenue shortfalls, the NT will sometimes exhaust its own domestic debt ceilings leading to interest rates escalation. Under

such instances, the NT is often forced to opt for enhanced external debt funding in order to reduce government overcrowding in the less developed domestic money market. To address such challenges, since mid-2000, the NT has been conducting various public finance management (PFM) reforms to mitigate the challenges of poor cash management. It is these reforms which suggested the establishment and use of Treasury Single Account as the main tool for the NT cash management. The TSA suggested entails idle amounts of cash sitting at bank accounts being swept back daily into a Treasury Funding Account (TFA) at the Central Bank of Kenya (CBK). This necessitated the review of the public finance legal framework in order to accommodate this change of the exchequer funding.

In 2012, the Public Finance Management Act (PFM), 2012 was enacted with a subsidiary regulation gazetted in the year 2015. The two legal instruments operationalized the TSA, which is currently under phased implementation by the NT. Under the current phase, MDA's effect their payments through separate MDA Payment Accounts (MPA's). The MPA's are funded from the exchequer account (EA) on a "just in time" basis, following requests made by the MDA's for the settlement of specific outstanding payables in the Integrated Financial Management System (IFMIS). The TSA is achieved through consolidation of all bank accounts in CBK's manual desk memo. The current set up has the advantage of ensuring that the exchequer releases are only done in accordance with the actual cash flow requirements of the MDAs. This means that short term budget financing through domestic debt borrowing, including CBK government overdraft is utilized when it is absolutely necessary. Furthermore, if this borrowing is not required owing to good MDA cash management practices, the domestic debt financing can be released for development budget financing or in support of the domestic money market development.

The objective of Cash Management implementation is to reduce short term and unplanned budget funding deficits that are often bridged through domestic short-term borrowings by

ensuring that the government does not hold idle cash balances. Due to shortfalls in the ordinary revenue of the government, the NT sometimes applies short term domestic debt proceeds in order to finance the budget funding deficit. The Cash Management implementation is in its mid-term of the implementation. Since its operationalization, there hasn't been any review nor planned review by the NT. This implies uncertainty on the achievement of the Cash Management set objectives

1.2 Statement of the Problem

Analyses on government borrowing and debt management in developing countries like Kenya have often focused on external debt. Mostly, the studies have looked at the relationship between external debt or public debt in totality (domestic and external) on economic growth. A number of reasons explains this scarcity and among them is due to the lack of a comprehensive database on domestic public debt and the historical prominence of external borrowing compared to domestic borrowing. Lately, foreign liabilities have been considered the largest component of the public debt and thus the main focus in debt management leaving out the domestic liabilities. However, the associated challenges with accessing foreign debt including global financial crisis, high oil prices among other factors has made substantial contribution to focusing on domestic sources to finance budget deficits in Kenya thus drawing the attention of International Financial Institutions (IFIs) and the academic community.

Based on the foregoing, the existing literature on domestic debt particularly on short term basis is relatively scanty and inconclusive. Further, a number of initiatives made by different countries to effectively manage short term debt like the National Treasury's cash management approach has had few empirical analysis (if any) to guide the monetary policy.

Although Kenya has maintained her debt portfolio at sustainable level of 53.1 per cent of GDP against the IMF recommended level of 74% for the lower income countries, as at end of June 2016 (public debt, 2016; and IMF, 2016), domestic borrowing levels can be further maintained at optimal levels through NT prudent cash management, hence alleviating the fiscal deficit gap. Unfortunately, there hasn't been relevant studies (to the best of our knowledge) to contribute to this strand of thinking. Therefore, this study purposes to use the idle balances held by the government in its CBK bank accounts as a measure of cash management to determine their impact on short term domestic debt. The study will also investigate other determinants on short term domestic debt in addition to the Cash Management.

1.3 Objectives of the Study

1.3.1 Broad Objectives of the study

The study seeks to evaluate the impact of the Cash Management policy being implemented by the National Treasury and other determinants (exchange rate, interest rate, inflation rate and GDP) on short term domestic debt performance.

1.3.2 Specific Objectives of the study

The specific objectives of this study are:

i. To determine the relationship between cash management policy and short-term domestic debt in Kenya
ii. To empirically investigate the long-run and short-term impacts of cash management policy on short term domestic debt in Kenya
iii. To establish other determinants of domestic short-term debt besides cash management policy in Kenya

1.4 Research Questions

This study will be guided by the following questions.

i. What is the relationship between cash management policy on short term domestic debt?

ii. How does cash management policy empirically impact on short term domestic debt in Kenya both in the short and long-run?

iii. Apart from Cash management policy, what are the other determinants of short-term domestic debt in Kenya?

1.5 Scope of the Study

The study focussed on evaluating the impact of the Cash Management policy being implemented by the National Treasury on short term domestic debt performance. Secondary monthly time series data from January 2010 to June 2019 was used in the study. The Data was obtained from the National Treasury and complemented with data from Central Bank of Kenya. As earlier stated, average monthly 91-day Treasury bill rates and CBK bank overdraft was used as dependent variables (measures of short-term domestic debt performance in Kenya). Five short-term variables were used as independent variables. This included, cash management policy, nominal exchange rate, inflation, Gross domestic product (GDP) and CBK interest rates. Data on cash management was collected by relying on documents and records obtained from the NT as well as using data obtained from the Central Bank. Generally, data on cash management was considered to be the cash balances with CBK at the end of each day averaged per month.

1.6 Significance of Study

Given this is a pioneer study (to the best of our knowledge), this study aims at filling the gap occasioned by studies putting more emphasis on external debt as opposed to domestic debt and how it is impacted on by cash management policy by using the most recent data to

analyses the effect of cash management on domestic debt in Kenya. Subsequently, the study purposed to contribute to a new strand of knowledge in the context of cash management policy instituted by the Kenya National Treasury. Basically, this study is seen as a foundational study upon which future studies can be based and will direct policy. More specifically, the findings of this study will;

1.6.1 Inform the National Treasury whether the ongoing policy implementation of the Cash Management policy is yielding desired objectives, suggest further interventions in the achievement of the Cash Management objectives.

1.6.2 Contribute relevant knowledge to academicians and policy makers on the relationship of cash management policy on short domestic debt and overall development policies in the area of public service cash management. Through the findings of this study, future studies could use these findings as a base and or academicians could also use the findings to their knowledge sharing.

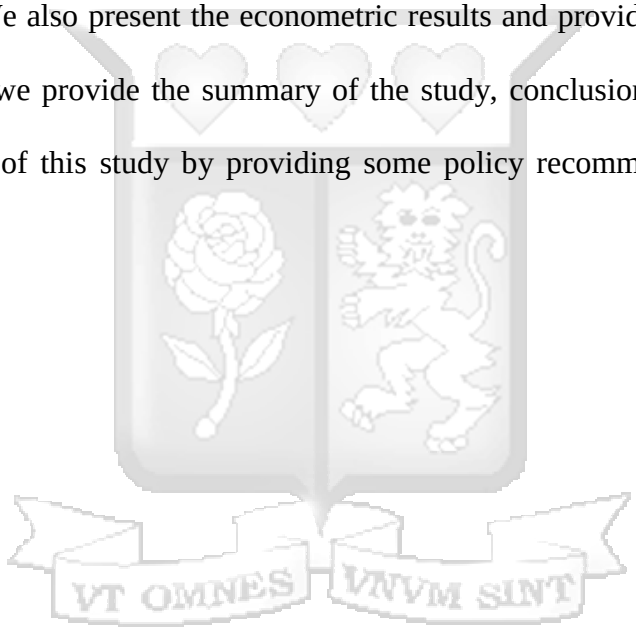
1.6.3 Facilitate the formulation and implementation of appropriate policies in relation to cash management in Kenya as guided by the findings.

1.6.4 Finally, the study will contribute to the knowledge and existing literature on the impact of the Cash Management policy being implemented by the National Treasury on short term domestic debt performance. This will provide new strand and thinking on the literature to be further improved, supported or disapproved by future studies in the subject matter.

1.7 Organization of the Dissertation

The rest of this dissertation is organized as highlighted; Chapter two is the literature review. The literature looks at short term debt and its determinants. More specifically, the chapter attempts to highlight a few issues in the area of cash management in the developing countries within the region, the rest of Africa as well as selected OECD countries that

belong to the league of developed countries. This chapter also presents conceptual framework of the study. In chapter three the methodological approach of the study is presented and justifications given both for the approach and proposed study data and analysis suggested. Other aspects discussed also include the research design, empirical estimation techniques, sample selection criteria and ethical research concerns. Chapter four presents the results of the study as per the analysis. This chapter starts by looking at the summary statistics. Consequently, in light of the data used, time series, we proceed to check on the stationarity of the variables in order to establish the appropriate method to use based on the findings. We also present the econometric results and provide a brief description. In the final chapter, we provide the summary of the study, conclusions and address the final specific objective of this study by providing some policy recommendations based on the findings.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter focusses on the review of the theoretical and empirical literature relating to short term domestic debts management, cash management policy and key determinants of short-term domestic debts. To address these, the study examines different theories, their proponents, the principles underlying these theories, applications and their relevance to the study in relationship to the variables of focus. The theoretical review is followed by a review of relevant empirical literature emphasizing on the study objectives, study methodology and the expected results. The chapter finalizes with a summary of the research gap and the proposed conceptual framework.

2.2 Theoretical Review

This study makes reference to two main theories: Classical and Keynesian theories in explaining the need for short term debts in countries and also vital in explaining determinants of short debts including cash management. Also, the study discusses debt management theory to explain how debts can effectively be managed in an economy.

2.2.1 Classical theory

The Classical theory states that governments create a debt burden on future generations by destroying their capital through borrowing (Woodford et al., 1995). The burden on the future generations would be to repay the loans plus the hefty interests incurred. This theory posits that a country can be rich without borrowing. Further, the theory justifies the debt burden only when governments employ the borrowed funds in the production of public goods. The theory therefore restricts the state within the limits of borrowing.

According to classical economists, there is no need of government intervention in the economy since when calamity strikes it will automatically be brought to the equilibrium. At

minimum functionality, there are no questions on huge public expenditure by the government and this does not necessitate large public revenues (Garegnani, 1984; Tsoulfidis, 2007). Classical economists further argued that government does not require fundraising in form of public debt and that government expenditure is wasteful and unproductive. In essence, the classical economists believed that public debt inflicts needless burden to the community.

Classical economists gave back-up to governments' balanced budgets that will not necessitate public borrowing but that governments should survive within their financial means. These economists discouraged public borrowing and advocated for borrow for productive projects and not governments' current expenditure (Bilan, 2016). The theory however does not take into account the unproductive nature of public expenditure and suggested that public debt ultimately affects the allocation of public resources.

According to the theory, governments' dependence on taxes for current expenditures and mandatory borrowing for productive government projects would lead to debt liquidation. While several researchers have criticized the classical theory, classical economists viewed a number of areas where state involvement was absolutely undesirable particularly in price fixation, regulation of industries, taxation of food commodities, and restriction on monopolies among many others (Tsoulfidis, 2007). The classical theory has mainly been criticized by researchers who argue that not every government expenditure is always unproductive. This implies that public debt may not always be a burden upon the economy. Secondly, the view concerning the transfer of debt is questionable. This is because the real public debt burden must be borne in the period in which public expenditure has been incurred through government borrowing program. Future generation not only inherits liabilities of the payment of interest and principal from the present generation but also inherits assets.

In relation to the current study, cash management policies are critical to governments in the management of financial crises. In essence, the existence of cash management policies calls for prior budgeting and cash management interventions that allow for equal distribution of available cash. This enhances the use of taxes for current government expenses and public borrowing only if it is necessary. According to Cangiano et al. (2013), debt management and cash management are most often viewed as two sides of the same coin. They posit that in countries such as Sweden and UK, debt management offices often take the responsibility of cash management. This they say, "increases the incentives to manage all government's financial resources as a single portfolio; it helps ensure confusing signals are not sent to the market regarding government's management strategy and it ensures that debt issuance decisions are made in the context of the government's overall cash flows"

In the context of other variables affecting short term debt, since markets operate in a flexible manner, it is needless to imagine that interest, exchange, inflation interests and GDP will impact on short term debts because these variables are set by the government in real sense while in the classical model they are to operate in a free flexible environment responding to the societal shocks.

Classical economists also indicate that proper cash management practices enable governments to generate government savings through accurate understanding of management of liquid financial assets and deficits. Therefore, this partly affirms the classical economists' argument of governments' good cash management practices that maximize the use taxes for current expenditures. However, Cangiano et al. (2013) address debt management that is not approved by the classical economists.

2.2.2 Keynesian theory

The Keynesian theory was developed by John Maynard Keynes in the wake of the 1930's great depression that brought about global financial crisis (Dwyer, 2011). Keynes came up with economic proposals regarding budget deficits, public debts and government's expenditure. The Keynesian model is used to explain the government's total spending and its impact on inflation and outputs (Roberts, 1995). This theory states that there is no real burden associated with public debt and it has no effect on economic growth but rather its effect is felt when resources are utilized. Domestic public debt is a debt that a country owes to itself hence it has zero effect on the country's real resource base (Panizza, 2008).

Keynes attacked the classical principles of budgeting and public finance and was of the school of thought that economy tends to be at equilibrium at full employment. He was of the opinion that rise in the National Income came with the increase in public debt through the multiple effects. Keynes linked public debts with deficit financing and ratified government to borrow for all purposes in order to effectively increase the economic demand thereby increasing employment and output. Keynes postulated that acquiring public debt for consumption was as appropriate as borrowing for investment in productive goods because consumption expenditure induced investment to rise (Musgrave, 1987).

Keynesian model was later affirmed by Premchand (1983) who considered government revenue, expenditure and debt as the only tools for the control of community expenditure. These tools would otherwise influence stable employment. According to Keynes, the nation's rate of spending was to be controlled using debt instruments which were to be sold to the public to utilize their idle balances and cashed to increase liquidity in times of depression.

According to Minsky and Kaufman (2008) the Keynesian theory gave advantages to the public debt in the sense that the economic effect of public debt is to be assessed in the light

of the nature of the expenditure for which debt is incurred and in terms of its potential to generate income. The theory further states that additional flow of income generated by increased debt financed expenditure facilities the payment of taxes to serve the debt. Furthermore, the theory argues that public debts endorse development of more institutionalized sources of savings like Banks, Capital Market and Insurance Companies (Beck *et al*., 2009).

The Keynesian theory, does not account for the nature of the government expenditure whether they are productive or not. Instead it considers huge public debt as a huge government investment on productive goods that will ultimately lead to rise in induced investment. Through the Keynesian theory, most governments including Kenya have accumulated lots of public borrowings, internal or external over the years. Apart from acting as a tool for enhancing growth and stability while combating inflation, public borrowing acts to balance the business cycle by utilizing unused savings from its own citizens to create demand that leads to economic recovery in case of depression.

Tily (2016) however suggests that both governments and lenders must be aware of interest rates and the risks thereof in order to avert bad saving effects. Although they incur public debts for development projects, sometimes governments overstretch their budgets thus increasing public expenditure. There is therefore a thin line between borrowing for current expenditures and public debt incurred in developing economic infrastructure that can hardly be sufficed through government revenues in form of taxes.

Therefore, Keynes theory argues that public debts are national assets rather than liabilities and correlates it to economic growth. This theory disapproved the claims of classical theory by putting into account lack of full employment and the possible productive nature of government projects. Secondly, the theory denies that public debt becomes a burden to

future generations but that they also inherit assets due to the public borrowings (Boyer, 2012). According to Stockhammer (2016), effective demand induced by public borrowings determines the level of output in the wake of unemployment.

Although it encourages public debts, cash management policies are inevitable in relation to Keynesian theory. Lack of good cash management practices may plunge countries into terrible inflation and financial crises. Therefore, fiscal and monetary policies should regulate public borrowings visa vis public expenditures. To serve the intended purpose of increasing national income, public debts should be able to induce demand that leads to income generation.

Stockhammer (2016) suggests that cash management is necessary for the liquid money that allows for flexibility amid dynamic business environs. The argument is that public debt creates deposits and can be used by governments to stabilize own currency. Similarly, Bilan (2016) suggests that public debts should be control ed and reserved for times of crises and that these debts should be utilized in economic value addition in terms of investment. Further, "public debt should not accumulate at a fast pace and should be kept within reasonable limits, to avoid possible side effects on economic growth" (Bilan 2016).

2.2.3 Debt Management theory

Faraglia, et al., (2008) were the pioneers of the debt management theory. According to this theory, the composition of government debt should be chosen bearing in mind the need to ensuring fluctuations in the market value of debt offset changes in anticipated future budget deficits In line with the theory, governments should issue long-term debt and invest in short-term assets. Moreover, the theory posits that fiscal policy and debt structure should be jointly determined for effective debt management. This is because the government's ability

to offset unexpected fluctuations in government expenditure or revenue, composition and value of debts is one of the keys of fiscal policy.

Building on the theory, Turner (2011) and Blommestein et al., (2012) observed that the separation of debt management from monetary policy worked well and remain unchallenged till the global financial meltdown, where a new era of fiscal dominance took over. Consequently, monetary policy and debt management themes must be harmonized for effective debt management. Therefore, in reducing fiscal vulnerability, debt management cannot be assumed particularly in the context of providing insurance against macroeconomic shocks which affect the government budget.

In tandem with the foregoing, Borenzstein et al., (2004) argue that to reduce fiscal vulnerability which includes cutting of spending programmes, the government has to issue debt instruments whose returns effectively address government consumption. In these contexts, the debt management theory is not only employed in explaining a county's debt composition and debt structure but can also explain the macro economic variables impacting on debt and offer solutions on best approaches on which variables are of key concerns in debt management.

2.3 Empirical Literature

2.3.1 Introduction and Literature on Domestic debts

Empirical review is a critical analysis of literature extracted from past studies and researches that are related to a topic. To achieve this objective, we consider past studies and researches from the local scene and those from the international scene too. We organize our literature in a manner that it responds to the objectives of the study.

Literature on domestic debt in Kenya is still relatively scanty (to the best of our knowledge) as most literature on debt mostly emphasise on external debt. The few studies available on domestic debt in Kenya have focussed on the rationale for domestic debt, its costs, debt sustainability, and extensively on its impact on economic growth (Makau et al. 2018; Njoroge, 2015; Ryan et al. 2014; Putunoi, 2013; Gikandu, 2012; Nandelega, 2010; and Maana et al. 2008). While it is not clear why most literature have neglected domestic debt, it is possible that it is because domestic debt is seen to only transfer resources within the country and the resources are left idle without productive activity. Therefore, meaningful results in terms of growth and development might not be evident.

According to Reinhart et al. (2011), domestic debt refers to the central government debt incured internally through borrowing in the local currency from residents in form of government securities (treasury bills, teasury bonds and long term stocks), overdrafts at CBK and advances from commercial banks. Most often, governments borrow to finance budget deficits since taxes are not sufficient enough to meet government demands.

Ian (2009) defines short-term debt also known as short-term or current liabilities as any financial obligation that is either due within a 12-month period or due within the current fiscal year. Consequently, treasury bill, is one of the short-term debt securities issued by a government for the purpose of meeting short-term cash flow obligations. It is essentially a loan to the government. By convention, government treasury bills have a term less than one year, typically three months or six months, at issue, and a maturity value that is a fixed, round number.

In Kenya, the National Treasury is mandated to solicit funds for funding the national budget on a yearly basis. The average nine year 2-period domestic public debt composition as percent of GDP has risen from 19% to 23.27% using 1999 to 2016 data (National Treasury,

2017). This implies that government plunges itself in borrowing to finance it's hefty budgets. The average fiscal deficit has moved from -1.85% between 1999 and 2007, to -6.35% between 2008 and 2016. The pattern of the domestic debt structure between the year 2000 and 2016 takes the expected form, where treasury bills are used to balance off any shortfalls from the targeted ordinary revenue collection and the treasury bonds issuance. The implication is that domestic debt component in financing fiscal deficit has continuously risen for the same period.

2.3.2 Impact of cash management and other determinants on short term debt

2.3.2.1 Impact of Cash management on short term debts

Acknowledging the limited studies done on impact of cash management on short term debts,particularly none for Kenya (according to our best knowledge), Lienert, (2009) defines cash management as the process of collecting and disbursing money. The study further argues that cash management ensures that the government has liquidity to implement its payments whereas minimizing costs, reducing risk and supporting other financial policies.

According to Yilmaz (2011), cash management involves the administration of liquid assets and liabilities in order to raise funds for investment. Liquidation best serves short term investments and short-term borrowings. Short term domestic public debts can therefore be managed through treasury cash management. Yilmaz (2011) further postulates that cash management is wide including cash flows, analysis of cash ratios, improving activities pertaining to cash, managing cash overflows and financing cash gap. Therefore, cash management aids in establishing and executing strategies for managing the government's debt in order to raise the required amount of funding, achieve its risk and cost objectives and to meet its debts.

Diamond and Khemani (2006) observe that the uptake of financial management reforms in the developing countries is slow owing to a number of reasons such as the lack of clarity in ownership and implementation authority, inadequate design, failure to undertake parallel reforms, lack of investment on required management input and a lack of incentives for reform. Coupled with their short-term budget finance shortfalls and in the absence of cash management functions, these countries resort to adhoc short term borrowings that make the management of fiscal and monetary operations complex (Williams, 2010). The argument by Williams (2010) is thus, putting in place an effective cash management policy will reduce short term debt.

Using selected OECD countries, cash management reforms appear to yield desired impact with countries such as Sweden posting consistent surplus cash balances in their budget execution as a result of efficient cash management function (Blondal, 2001). This is further confirmed by Phiri (2015), who showed that a number of OECD countries (Belgium, France, Netherlands, Sweden and United Kingdom) with well-developed cash management function, manage to fine tune their shortfalls in order to stabilize the impact of government cash flows on the money market thereby facilitating the implementation of monetary policy by their central banks.

The operatives of the cash management function according to the Asia Development Bank (2003) are meant to ensure accurate and timely forecasting of cash flow and balances; a more efficient and responsive cash management processing and service provision; the management of the consolidated risk positions; and the cash and debt management integration. These according to Sailendra and Israel (2010) are best achieved through the use of the Treasury Single Account (TSA) as the main tool in cash management.

In support of the Treasury Single Account, Ian (2009), argues that the establishment of the TSA is key among the six fundamental features in dealing with the developing countries cash management challenges. Similarly, he highlights the main objectives of cash management tool as ensuring adequate cash availability in the payment of expenditures when they fall due, borrowing when necessary, maximization of the returns on idle cash and the management of risks through investing temporary surpluses productively.

Ian (2009) proposes cash management measurement in terms of cash balances with CBK at the end of each day. He further posits that in order to finance budget funding cash deficit, the NT uses CBK bank overdraft facility and the short-term domestic borrowings. Sound cash management through the implementation of TSA ensures that this practice is minimized contributing to overall public debt management. Therefore, cash management is indirectly related to short term debt.

According to Ahmed, (2016) a unified structure of government banks should allow for complete fungibility of all cash resources. This caters for real time processing where electronic banking is in place. On the other hand, the National Treasury should be able to have an oversight of all its bank accounts operated by all government entities. A stable cash balance in the TSA ease the monetary policy since the government cash balances become largely neutral for monetary policy considerations (Williams, 2009).

In his study on the effects of TSA on public finance management in Nigeria, Yusuf (2016) shows that the implementation of a Treasury Single Account is capable of plugging financial loopholes as well as promoting transparency and accountability in the public financial systems. This is despite Nigeria having no legislation governing the implementation of a TSA.

In their study on cash budgets for Uganda and Malawi, Stasavage and Moyo, (2000) showed that countries that have a functional cash management policy either in terms of cash budgets policy or deliberate cash management interventions, tend to narrow their annual fiscal deficits overtime, and also reduce their monetary policy financing that lead to lower inflation.

Giovanna et al., (2014) argue that excessive domestic borrowing as a result of poor cash management practises can induce macro economic distortions and instability. Besides the crowding out effect, they also attribute hyperinflationary episodes and external debt crisis to excessive domestic borowing. The demand for domestic debt is created by poor cash management discipline at the national treasury that acts as an incentive by the banks and other institutional investors to absorb excessive public debt demand.

Similarly, the study (Giovanna et al., 2014) highlights that in the short run, such financial institutions tend to be less efficient in the absence of government demand for domestic debt since they are more likely to prefer short term portfolio allocation hence building additional vulnerabilities. Narrowing of domestic debt demand by the national treasury through effective cash management is expected to offer operational efficiency to these financial institutions, which is critical for a stable economic performance.

Furthermore, timely financing of government development plans which is an outcome of effective cash management practices according to Williams (2010) implies that development projects can be completed within the scheduled time hence yielding timely economic development outcomes.

In order to enhance economic performance, Mario et al., (2012) underscores the importance of integrating cash management and monetary policy into a broader macroeconomic framework of analysis that ensures a consistent policy mix. They observe that besides fiscal

and monetary policies, cash management policy as argued by (Hans et al. 2011) is a key tool in the management of financial crisis.

Mike et al., (2014), observe that in response to the financial crisis of 2008-2009, Hungary raised her cash buffer in order to contain the financial crisis effects. According to them, one of the lessons in managing financial crisis such as witnessed in the 2008-2009 financial crisis is the ability for the countries to access cash in a very short time. Such will require an elaborate cash management policy in place. Domestic cash management crisis can have contagion effects that can easily contribute to a regional or global financial crisis depending with the economic exposure and interdependency. Similarly, cash management can be used to smoothen the effects of a financial crisis.

In order to manage reduction of economic growth, the need to examine the source and the effect of budget deficits is underscored by (David, 2006) in his argument that budget deficits can reduce economic growth, and can also lead to a crisis. Budget deficits management can greatly benefit from good cash management practices. (Alta, 2006) observes that lack of cash management policy causes repetitive budgetary and skewed distribution of available cash. Cash allocation is prioritised to powerful ministries rather than highest priority functions. This lead to ministries spending against approvals, rather than available cash resulting in a build up of payment arrears that is a form of public debt. According to (Alta, 2006), effective budget implementation reform require a pillar support of effective cash management that smoothes cash flow to expenditure agencies against revenue flow volatility in addition to a transparent cash allocation system.

Paul et al.,(2016) argue for a weak cash management function at the Kenya National Treasury. This comes against a backdrop of widening fiscal deficit and an increasing appetite for domestic debt financing by the National Treasury. The lack of a fungible

unified structure and national treasury control of government bank accounts for example, means that the utilized amount of government overdraft at the Central Bank of Kenya (CBK) is based on the position of the overdraft account itself, rather than the net government cash position at the central bank.

2.3.3.2 Other determinants and their impact on Short term debt

In terms of the other determinants and their impacts on short term debts, Maana et al. (2008) analyzed the economic impact of domestic debt on Kenya's economy. Examining the impacts of domestic debt on private sector lending applying ordinary least square technique using annual data over the period 1996 to 2007, the study found out domestic debt does not crowd out private sector lending in Kenya during the period of the analysis due to substantial level of financial development in Kenya. The study also examined the effects of domestic debt on real output by using a modified Barro growth regression model. The results indicated that increase in domestic debt has a positive but insignificant effect on economic growth during the period. As a recommendation, the study suggested the employment of wider reforms to promote investment in treasury bonds and encourage institutional investors.

Gikandu (2012) carried out a study that aimed at establishing the relationship between domestic debt and economic growth in Kenya. Using a twelve year time series period from 1999/2000 to 2010/2011 and a descriptive design using Spearman's rank correlation, the study revealed a weak positive relationship between the domestic growth and economic growth. This implied that for the period of the study the use of domestic debt has had some slight contribution to economic growth. The study recommended the use of domestic debt by the government so that the interest bill therein does not have a negative impact on economic growth.

In 2013, Putunoi (2013) investigated the effects of domestic debt on economic growth in Kenya using quarterly data spanning 2000 to 2010. To test for stationarity, the study used Augmented Dickey-fuller, and tested for cointegration using Johannes Cointegration. Subsequently, the study also used error correction model. Their findings showed domestic debt expansion in Kenya has a positive and significant effect on economic growth contradicting the earlier findings by Maana et al. (2008).

From the international scene, Fischer and Easterly (1990) underscored that borrowing domestically in order to finance fiscal deficit can increase interest rates and lead to a debt crisis. This position is supported by Vincent et al. (2000). Using a panel data set of real time OECD budget projections in nineteen countries for twenty years, they show that a narrowing government debt has the implication of falling real interest rates.

According to Christensen,(2005) the short term maturity of domestic government debt is a source of rollover risk and macroeconomic instability, in addition to the overcrowding effect on private sector borrowing. Furthermore, owing to the lack of capacity by the developing countries to issue long-term government securities at reasonable interest rates, these countries' exposure to maturity mismatch becomes higher than foreign debt currency risk (Panizza, 2008).

Oshadami (2006) cited in Adofu and Abula (2009), concluded that the growth of domestic debt has affected negatively the growth of the economy. This situation is premised on the fact that majority of the market participant are unwilling to hold longer maturity and as a result the government has been able to issue more of short term debt instruments. This has affected the proper conduct of monetary policy and affected other macroeconomic variables like inflation, which makes proper prediction in the economy difficult.

Abbas and Christensen (2007) examined the role of domestic debt markets in economic growth: an empirical investigation for low-income countries and emerging markets using panel econometric techniques to examine the endogeneity of domestic debt and its impact on growth with a view to obtaining a sense of the optimal size and quality of domestic debt. Their findings revealed that higher private savings increase the scope for domestic debt issuance while a larger supply of domestic debt instruments provides incentives to increase private savings.

Adofu and Abula (2009) investigated the effects of rising domestic debt on the Nigerian economy by applying OLS technique using time series data from 1986- 2005. Their study findings revealed that high budget deficit, low output level, increased government expenditures, high inflation rate and narrow revenue base are the factors responsible for rising domestic debt in Nigeria. More specifically, their analysis showed that domestic debt has negatively affected the growth of the economy and recommends that government should make efforts to resolve the outstanding domestic debt.

Rahman, (2012) states that inflation is a good indicator of purchasing power. Thus, money loses purchasing power during inflationary periods since each unit of currency buys progressively fewer goods. Inflation can be explained in the context of fiscal and monetary aspects. In the monetary aspect, inflation is considered to be due to an increase in money supply while, budget deficits are the fundamental cause of inflation in countries with prolonged high inflation in the fiscal aspect. Accordingly, high inflation would therefore mean high debt levels. More clearly, inflation and inflation expectations also are factors in determining interest rates--for example, periods of relatively high (low) rates of inflation usually are associated with relatively high (low) interest rates on T-bills.

A study on determine the relationship between domestic debt and interest in Kenya by Kariuki, (2013) explored the use of a modified a modified version of Adofu and Abula (2009) Classical Linear Normal Regression Model (CLRM). Using a 10 year period (2003-2012) secondary data, the findings revealed that there was a positive relationship between domestic debt and interest rate, thus domestic debt positively affects the interest rate in Kenya.

According to Benedict, Ehikioya & Asin (2014), exchange rate is a key determinant of domestic debt. Based on the movement in the foreign exchange rate, it is possible to define the competitiveness of the domestic currency in the global market. For example, countries with a strong currency tend to inverse relationships with the level of indebtedness.

Benedict, Ehikioya & Asin (2014), argues that GDP is a growth variable indicative of the economic conditions in a given country. Increased GDP growth would mean increased of growth existence of domestically generated financial resources for utilization in the expenditure. Thus, T-bill rates (measure of short-term debt) typically rise during periods of business expansion (growth) and fall during recessions declining growth). Therefore, an increase in GDP results to a decrease in debt.

In the same line of thought, Awan, Anjum & Rahim (2015), a strong currency indicates strength in economic indicators and the participation in export-oriented production. The study showed that exchange rate is a statistically significant determinant of debt (both short and long-term debt). Generally, exchange rate provides intrinsic indications of the stability and strength of an economy, since it affects the competitiveness of the currency in international markets. A weaker currency implies that a country has to source additional financing in order to participate in international trade and domestic expenditure. Consequently, exchange rate is found to negatively relate with short term debts.

Another key determinant of debt is interest rates. Interest rate is a monetary policy action by the Central Bank that affect the flow of money in the economy and influences short-term T-bills. When interest rates rise, treasury bills rate falls and when interest rates fall, treasury bills rise. The interest rate used here will be that of the interbank money market. According to Mohanty, and Klau, (2004), treasury bills are more predictably influenced by the interbank money market interest rate because both are competing investments in the money market. Therefore, there is negative relationship between interest rates and treasury bills. Further, past studies have shown that debt contracted to finance the budget deficit is a primary source of crowding out private investments. That is, the implication of huge borrowings by the Government is an increase in interest rates. The increase in interest rates may reduce or crowd out private-sector investments.

In a recent study by Adetokunbo et al., (2019), using a multivariate vector error correction framework in analyzing data obtained from Central Bank of Nigeria, World Bank National Accounts Data and Debt Management Office between 1970 and 2015 revealed that long run relationship exists among domestic debt, budget deficit, financial deepening indicator, external debt, interest rate and GDP growth rate. The results also showed that lagged values of budget deficit, external debt and GDP growth rate explain variations in current domestic debt in the short run while lagged value of domestic debt explains variations in budget deficit, external debt and GDP growth rate in the short run. In terms of recommendation, the study suggests that increasing domestic debt should be redirected into productive capital expenditure, thereby eliminating recurrent fiscal financing.

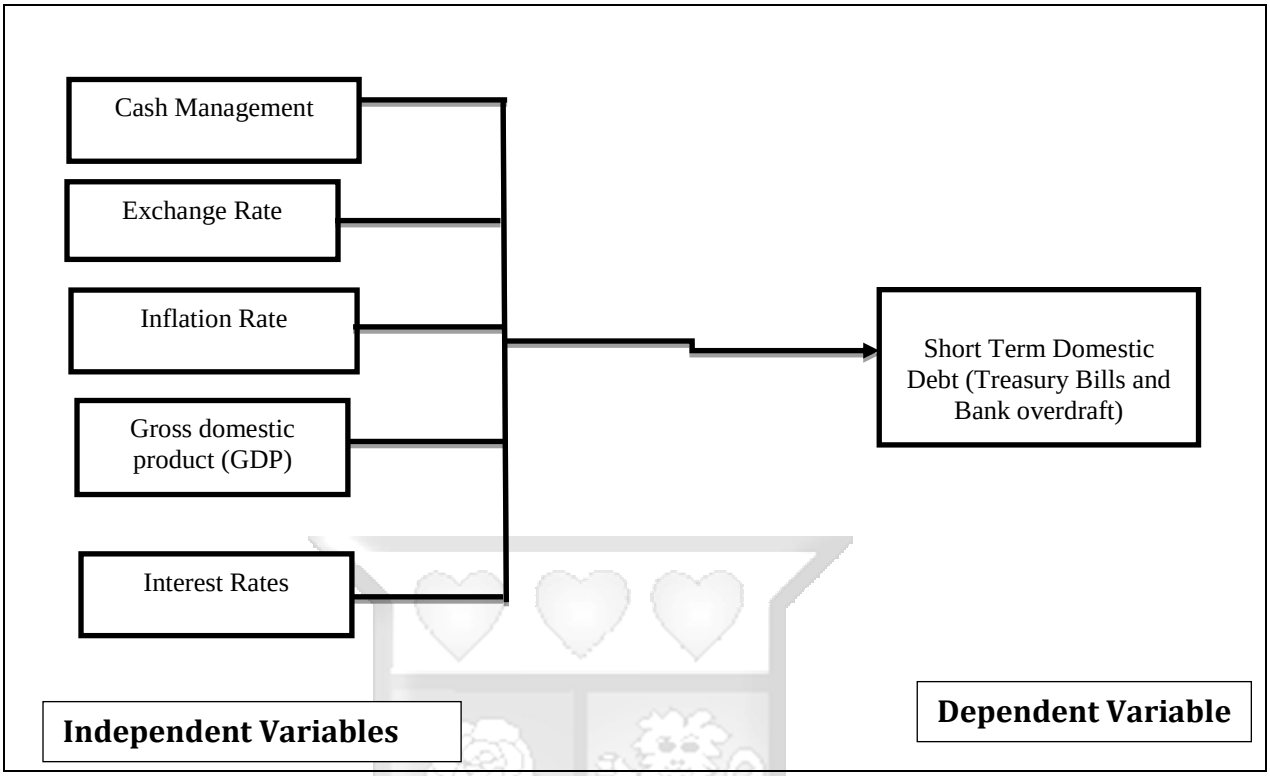
2.4 Summary and Research Gap

The need for the Kenya National Treasury to pursue a Cash Management policy is supported by empirical research in the area of Fiscal and Monetary policy pursued by governments. From the literature reviewed, Cash Management is a cross cutting function in support of fiscal and monetary policies. Efficient cash management is a critical function in pursuant of the fiscal and monetary policies. The effect of cash management on domestic debt performance in Kenya is unexplored. This study focuses on the impact of cash management policy by the National Treasury on the Kenya short term domestic debt levels and other determinants of short term domestic debt in Kenya.

2.5 Conceptual Framework

The conceptual framework below in figure 2.1 was developed in response to the research objectives and as informed by literature in the foregoing section. The level of the short-term domestic debt, herein known as dependent variable was operationalized by treasury bills and bank overdraft. On the strength of the literature reviewed, short term debt is determined by a number of independent variables such as cash management, exchange rate, inflation rate, interest rate and GDP. Therefore, this relationship is conceptualized as below:

Figure 2.1: Conceptual Framework



2.6 Definition and operationalization of Variables

A description of how the variables (dependent and independent) utilized in the study were measured is done in this section. This has been depicted in the table 2.1

Table2.1 Definition and Operationalization of variables used in the study

Variable Definition	Abbreviation	Reference Source
Cash Management refers to efficient utilization of government cash balances available at the National Treasury. Cash management will be measured using the amount of idle cash held at the MDA and Counties bank accounts at the end of the working day.	cashmgt	Phiri (2015) Ian (2009)
Exchange rate is the rate at which Kenyan currency is exchanging for the US dollar currency. It is measured in terms of the value of Kenya's currency versus the US dollar currency.	Extrate	Benedict et al., (2014),

Variable Definition	Abbreviation	Reference Source
Inflation is a sustained increase in the average price of all goods and services produced in an economy. It is a good indicator of the purchasing power of money. In this study, its measured by the inflation rates reported monthly by CBK	Inf	Rahman, (2012)
Gross Domestic Product (GDP) is the growth variable which is measured as monthly GDP growth rates.	GDP	Benedict et al., (2014),
Interest rate is the rate at which banks lend one another excess reserves (the reserves they don't need to satisfy capital requirements overnight) in the interbank money market. Its measured by the interbank lending rates	Intrate	Mohanty et al., (2004)
Treasury bills means the actual Kshs amounts in terms of Treasury Bills borrowed by the National Treasury for the budget period.	Tbill	
CBK overdraft utilization level, means the NT overdraft facility offered by the CBK in Kshs, in order to finance short term budget financing deficits, and is usually fully retired at the end of the fiscal year. The measure will be the total overdraft utilized for the period on a monthly basis.	Bankdraft	Reinhart et al., (2011)

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter provides the methodology that was used in the study. Part of what the chapter covers includes research design, study population, sampling design, and data collection methods, data analysis and presentation of the findings, key assumptions and ethical considerations. Given the nature of the data used, we also present, empirical model and estimation procedure, diagnostic tests including unit root tests, cointegration and use of error correction model.

3.1 Research Design

This study involved exploratory study design to examine the impact of Cash Management and other determinants on the short-term domestic debt performance. Using quantitative data of both the dependent and independent variables, the study sought to test the existence of relationships between or among the levels of short-term domestic debt and cash management, inflation rate, interest rate, exchange rate, and Gross Domestic product. Correlative causal design was used in establishing these relationships while exploratory study was helpful in confirming both relationships and establishing impacts. Generally, the data of use was past data, that is time series data.

Treasury bills and CBK bank overdraft were used to capture the domestic short-term debt/monetary policy action while cash management, gross domestic product, inflation, exchange, inflation and interest rates were used as independent variables. Regression analysis was used to determine the underlying relationship and impact between domestic short-term debts and the independent variables. This design was appropriate since it allowed for both short run and long run pass-through analysis in terms of magnitude and speed of adjustments to changes in monetary policy rates.

3.2 Target Population and Sampling

This study entailed a case study of Kenya National Treasury Cash Management policy impact on the short-term domestic debt and other determinants on short-term domestic debt. A 54-monthly period between January 2010 to June 2019 was selected on which the research is based. This period was picked because this was the period within which cash management has been operationalised at the National Treasury. Besides, we had available and consistent data for the period. The period was also representative enough in evaluating the impact of the Cash Management policy being implemented by the National Treasury on short term domestic debt performance in Kenya.

3.3 Data Collection Methods

Secondary monthly time series data ranging from January 2010 to June 2019 was used in the study. This data was obtained from the National Treasury and complemented with data from Central Bank of Kenya. Average monthly 91-day Treasury bill rates and CBK bank overdraft were used as dependent variables while cash management policy, nominal exchange rate, inflation, Gross domestic product (GDP) and CBK interest rates were used as independent variables. Data on cash management was complemented by relying on documents and records obtained from the three cash management departments of the NT namely the Macro, Debt Management and the Accountant General Departments. For this study, data on cash management was considered to be the government cash balances with CBK at the end of each day averaged per month.

3.4 Data Analysis and Empirical Approach

3.4.1 Data Analysis

Kothari (2004) states that data analysis is the process of systematically applying statistical and logical techniques to describe data. Once the secondary data had been collected, it was entered, cleaned and analyzed in Eviews 11 software using different stages. The first stage

involved describing the basic features of the variables used in the study (descriptive statistics). The data was therefore summarized in terms of the number of observations per variable, the mean, standard deviation and the range between the minimum observation and the maximum observation. This analysis also established whether there were some observations in the sample that would be considered as outliers. The second stage of data analysis was a bivariate analysis, in which the relationship between the variables was established. This involved establishing the quantitative measures of dependence and independent variables. This was measured using Pearson's correlation coefficient. In the final stage of data analysis, this study used multiple regression methodology in order to analyze whether and the nature of relationships that existed between or among the levels of short-term domestic debt instruments and cash management at the National Treasury for the period under study.

3.4.2 Empirical Approach

While the initial plan of the study was to adopt a co-integration model founded on the Johansen and Juselius (1990) and Engle and Granger (1987) approach, this was not used in this study after the stationarity test showed a mixture of variables which became stationary after first difference, I(1) and stationary variables at levels, I(0). Consequently, Autoregressive Distributive Lag (ARDL) Bound Test model was used. Autoregressive distributed lag models have been in use for decades, but in more recent times, they have been shown to provide a very valuable vehicle for testing the presence of long-run relationships between economic time series variables of different orders particularly order one and at level (order zero).

The ARDL cointegration approach was developed by Pesaran (1997), Pesaran and Shin (1999) and Pesaran *et al*. (2001). It has several advantages in comparison with other cointegration methods such as Engle and Granger (1987) and Johansen and Juselius (1990)

procedures. For example, it can be applied whether the variables under the study are not integrated of the same order, while Johansen cointegration techniques require that all the variables in the system be of equal order of integration. This means that the ARDL can be applied when underlying variables are integrated of order one, zero of fractionally integrated. Also, the ARDL test is relatively more efficient in the case of small and finite sample data sizes while the Johansen cointegration techniques require large data samples for validity. The ARDL methodology yields estimates and valid *t*-statistics, even in the presence of autocorrelation and endogeneity (Harris and Sollis, 2003). A simple error correction (ECM) model provides short-run coefficients along with long-run equilibrium without losing valid long-run coefficients. And finally, the ARDL model can be regarded as the equal number of lag length for all variables or different orders of lag without affecting the asymptotic distribution of the test statistic (Pesaran *et al*., 2001).

The primary model that shows the linear relationship between the domestic short-term debt and cash management policy can be presented as:

$$y_t = \beta_0 + \beta_1 x_t + \mu_t \quad \text{..... (3.1)}$$

Where y_t represents the endogenously determined short term domestic debt (Treasury bill and CBK bank overdraft); x_t is exogenously determined cash management policy, nominal exchange rate, inflation, gross domestic product (GDP) and interest rates; β_0 Denotes the intercept coefficient; β_1 Long-run parameter determining the impacts on domestic debt (Treasury bill and CBK bank overdraft). μ_t is the stochastic error term

It is expected that there will be an inverse/negative relationship between gross domestic product, exchange rate, interest rate and short-term debt while a positive relationship is expected between cash management, inflation and short-term internal debt.

For purposes of estimation, the relationship between the variables is outlined as follows;

$$TBill_t = \alpha_0 + CashMgt_t + Exrate_t + Inf_t + GDP_t + Intrate_t + \mu_t \quad \text{..... (Equation 1)}$$

$BankOverdraft_t = \alpha_0 + CashMgt_t + Exrate_t + Inf_t + GDP_t + Intrate_t + \mu_t$ …… (Equation 2)

Where $TBill_t$ is Treasury Bill at time t; $CashMgt_t$ is Cash Management at time t; $Exrate_t$ is Exchange Rate at time t, Inf_t is inflation at time t, GDP_t is Gross Domestic Product at time t; and $Intrate_t$+ is Interest rate at time t; while μ_t remains the stochastic error term

3.4.2.1 Key Assumptions

The relationship stated in equations (1) and (2) assumes that external loans and treasury bonds obtained is equalized across the study period and therefore in the short run, cash management practices do not have any influence on the two sources of public debt.

3.4.2.2 Unit Root Tests

In order to investigate the link between cash management policy and domestic debt in Kenya while avoiding any spurious regressions, stationarity of the data was investigated. First, as per the common practice, we investigated the time series variables by using a unit root test in each series prior to estimating any equation. Where there was a unit root, the series were differenced until they became stationary. Naturally, as already mentioned, an estimation hinged on non-stationary factors may cause spurious findings that are indicative of high R2 and insignificant t statistics. To carry out unit root test, we used Augmented Dickey Fuller (ADF). ADF has three different specifications, the first eliminates both the inclination and the intercept, second description comprises the intercept, and the third measurement contains both the slope and the fixed term. ADF tests the null hypothesis that a series contains a unit root against the alternative hypothesis of stationarity. In addition, the Durbin-Watson test was conducted to establish that the error term is randomly distributed with constant mean and variance over successive time periods.

3.4.2.3 Cointegration Test

After checking for the presence of unit roots in the variables, we proceeded to investigate the long-run relationship among variables. Since we found out that all the variables were either integrated at levels, I(0) or integrated of order one after first differencing, I(1), we couldn't use Johansen and Juselius (1990) cointegration test to investigate any possible long term relationship among nonstationary variables as earlier proposed. Rather, guided by economic theory, we used ARDL Bound Test model in our analysis.

3.4.2.4 Autoregressive Distributive Lag (ARDL) Model

As already mentioned, the test of stationarity necessitated the use of this model as the results indicated that the series are integrated of different orders. For example, the series were found to be stationary both at level (I(0) and stationary after first difference (I(1**).** This meant that we couldn't apply classical regression techniques to evaluate the impact of the Cash Management policy being implemented by the National Treasury on short term domestic debt performance. ARDL is the standard Least squares regressions that include lags of both the dependent and independent variables as regressors (Green, 2008). In the same length ARDL are considered linear time series models in which both the dependent and explanatory variables are related not only contemporaneously but across historical (lagged) values as well. In this analysis, we used ARDL bounds test to see if the variables were cointegrated. We started this process by finding out the optimal lag structure before proceeding to estimate the short-term and long run dynamics including the error correction terms.

A number of diagnostic tests were employed. For example, we used Augmented Dickey fuller to test for stationarity of variables. Further, the ARDL bound test technique was used to test for co-integration between series of non-stationary data. Guided by the results, the

Error Correction based approach was used to present the estimation results, particularly, the speed of adjustment.

The study adopted other data management techniques such as transforming the variables by taking logarithms of cash management values, treasury bills and bank overdrafts given their high absolute values. This transformation made the distribution normal and aided in interpretation of the coefficients estimated.

3.4.2.5 Model checking and Diagnostic Tests

Model checking and Diagnostic analysis was carried out in this study. Majorly, the Breusch–Godfrey test/Langrage Multiplier (LM) test was used to test for serial correlation, a situation where the residuals are correlated (if residuals are correlated the estimations are biased and inconsistent).

For model checking, test for Stability of Parameters was done, the situation where the parameters remain constant over time using the CUSUM (cumulative sum) and CUSUMSQ (Cumulative sum square) based on recursive regression. The CUSUM test plots both sequences of CUSUM and the critical lines for conducting CUSUM test. All these econometric tests and analyses were done using EViews 11 software.

3.4.2.6 Operationalization of the Study Variables

The study variables were operationalized as shown in table 3.1 below.

Table 3.1: Operationalization of the Study Variables

Study Objective	Hypothesized Relationship	Measurement	Analysis
To determine the relationship between cash management policy and short-term domestic debt in Kenya	Cash management has significant relationship with short-term debts	The monthly average amount of idle cash held at the MDA and Counties bank accounts at the end of the working day.	Correlation Coefficient analysis
To empirically investigate the long-run and short-run establish the impacts of cash management policy on short term domestic debt in Kenya	Cash management significantly impacts on short-term domestic debts	The monthly average amount of idle cash held at the MDA and Counties bank accounts at the end of the working day.	Descriptive statistics including the mean and standard deviation Time series analysis
To establish other determinants of domestic short-term debt besides cash management policy in Kenya	Exchange rate, inflation rate, Gross domestic product (GDP), and interest rates significantly affects Treasury bills and bank overdraft.	Exchange rate is the daily rate at which Kenyan currency is exchanging for the US dollar currency consolidated monthly. Inflation is the monthly average price of all goods and services produced in the Kenyan economy. Gross Domestic Product (GDP) is the monthly GDP growth rates. Interest rate is the monthly average rate at which banks lend one another excess reserves (the reserves they don't need to satisfy capital requirements overnight) in the interbank money market.	Descriptive statistics including the mean and standard deviation Correlation analysis Time series analysis

3.5 Research and Data Quality

Scholarly peer reviews of past studies, particularly journals, working papers and previous dissertations were done in order to safeguard the research quality. This was further addressed through provision of sufficient information concerning the major research components of the study by describing target population of interest, defining key concepts and variables, providing the descriptive statistics of the main variables and their

correlational relationships. Further empirical analysis and estimations beyond the description of the analytic techniques also enhanced research quality in this study. An attempt was made to sufficiently and scientifically respond to the research questions with rigor. Fully aware of the negative effects of bad quality data, in assembling the secondary data for use in this study, every effort was made to ensure that the data assembled complied to the characteristics of data quality such as accuracy, completeness, timeliness, relevance, validity, consistency among others.

3.6 Ethical Considerations

In conducting this study, where external data was sought or required external validation, those responsible were well informed to the need for the data and the expected contribution of this study to various stakeholders. This research received ethical approval from the University Institutional Ethics Review Committee (SU-IERC) and was duly licensed by the National Commission for Science, Technology and Innovation (NACOSTI).

CHAPTER FOUR

DATA ANALYSIS, RESEARCH FINDINGS AND INTERPRETATION OF RESULTS

4.1 Introduction

This chapter deals with presentation of the analysis process, findings of the study and their interpretations. The results will be discussed and elaborated and in line with economic theory and similar studies. The analysis is based on monthly data observed from January 2010 to June 2019 which means that the total number of observations is 110. Whereas descriptive and inferential statistics were used to interpret the results of the study, tables and graphs were also used where necessary. As mentioned in the previous chapter, the study results are presented in three stages: descriptive statistics, correlation matrix and regression analysis.

4.1 Descriptive statistics

The table below (table 4.1) presents the summary statistics of the dependent and independent variables used in this analysis. Under this section, we also establish trends of the variables over the 8.5-year study period in Kenya through graphical presentations.

Table 4.1: Descriptive statistics of the variables

Variable	BANK DRAFT	CASHMGT	GDP	INF	INTRATE	MDA COUNTY	MDA NATIONAL	TBILL	XRATE
Mean	27.11	191.98	5.14	7.25	15.64	37.06	168.90	376.78	92.59
Median	25.37	174.12	5.42	6.58	15.33	35.29	144.99	281.21	91.43
Maximum	64.82	528.47	11.60	16.50	20.34	69.19	465.71	924.55	105.18
Minimum	0.00	33.94	-5.42	3.73	12.47	18.00	33.94	101.89	75.79
Std. Dev.	12.92	103.82	1.86	3.02	2.27	12.18	87.31	256.13	8.54
Skewness	0.05	0.60	-1.83	1.74	0.45	0.60	0.73	0.76	-0.17
Kurtosis	3.04	2.67	12.78	5.47	2.12	2.80	2.98	2.20	1.49
Jarque-Bera	0.06	7.38	517.48	86.31	7.54	4.39	10.05	13.97	11.29
Probability	0.97	0.02	0.00	0.00	0.02	0.11	0.01	0.00	0.00
bservations	114	114	114	114	114	71	114	114	114

Note: Where TBILL is Treasury Bill at time t; CASHMGT is Cash Management at time t; EXRATE is Exchange Rate at time t, INF is inflation at time t, GDP is Gross Domestic Product at time t; MDANA is the cash management at National level at time t; MDACOUNTY is cash Management at County level and INTRATE is Interest rate at time t.

From the above table 4.1, it can be observed that over the period of analysis, the average bank overdraft has been 27.1B; total cash management is 191.98B. The average cash management for counties for the period was 37.06B (from August 2013 when devolved system of government was operationalized to June 2019) while that of national government was 168.90B.); on average, the exchange rate stood at 92.59; the average GDP growth rate for the period was 5.14; inflation rate of 7.25; interest rate of 15.64 and an average of 376.78B for treasury bills.

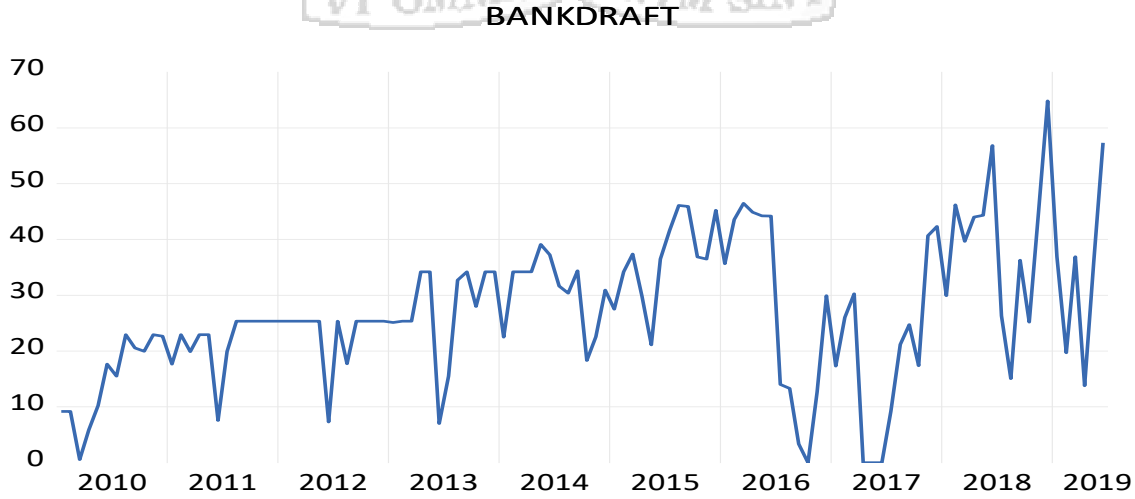
The highest GDP growth recorded during the period is 11.60 in December 2010 while the lowest was in January 2012 which stood at -5.42%. Inflation rate seems to be above the projected rate of 5% on average with the highest rate of 16.5% in April 2012 while the lowest rate ever achieved was 3.73% in April 2018. Generally, the exchange rate has remained stable over the period with both the highest exchange rate being experienced in September 2015 at a high of 105.18 while the lowest exchange rate realized was 75.79 in January 2010.

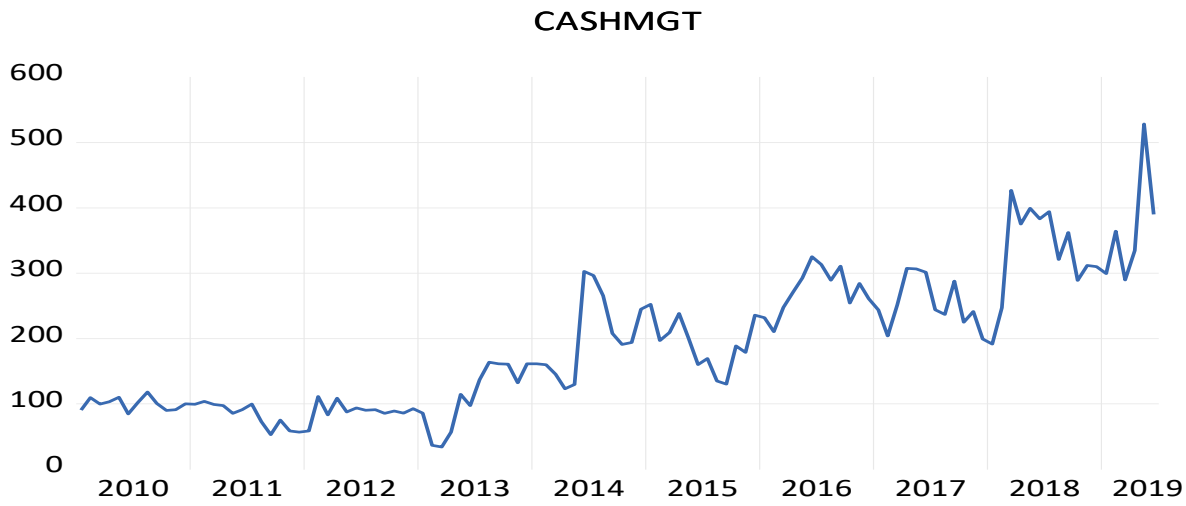
In terms of cash management, the highest value was 528.47B in May 2019 while the lowest was 33.94B in March 2013 before devolution was implemented in August of the same year.

The highest interest was experienced in March 2012 at 20.34 and the lowest in February 2019 at 12.47. The highest values of treasury bill were witnessed in April 2019 at 924.55B while the lowest was in April 2011 at 101.89B. In relation to bank overdraft, the highest was 64.82B in December 2018 and the lowest was 0 in October 2016 and between April and June 2017. The cash management values for counties show that the lowest in the counties was experienced at the start of devolution with a value of 18B while the highest was realized in April 2019 standing at 69.19B.

Looking at the Jarque-Bera statistic which measures the difference between the difference of skewness and kurtosis of the series with those from the normal distribution, for most of the variables, the probability values are highly statistically insignificant (Cash management, GDP, inflation, interest rate, MDA National, treasury bill, and exchange rate) thus we cannot reject the null hypothesis of normal distribution. On the other hand, bank overdraft and MDA county have statistically insignificant probabilities, implying that these variables may not normally distributed (the later may not work as the MDA county probability value is 0.11, almost significant at 10%).

Graphical Presentation of the trends of the variables




CASHMGT
600
500
400
300
200
100
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


GDP
12
8
4
0
-4
-8
2010
2011
2012
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2014
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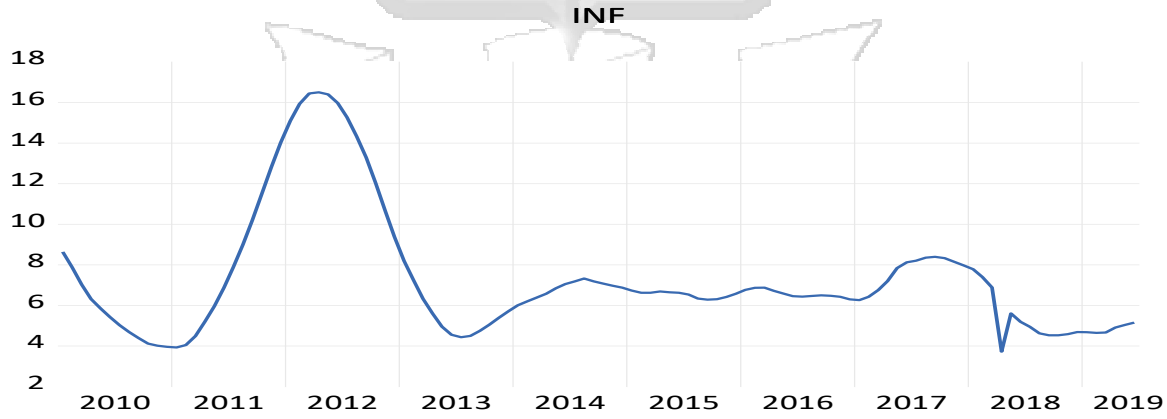
2016
2017
2018
2019


INF
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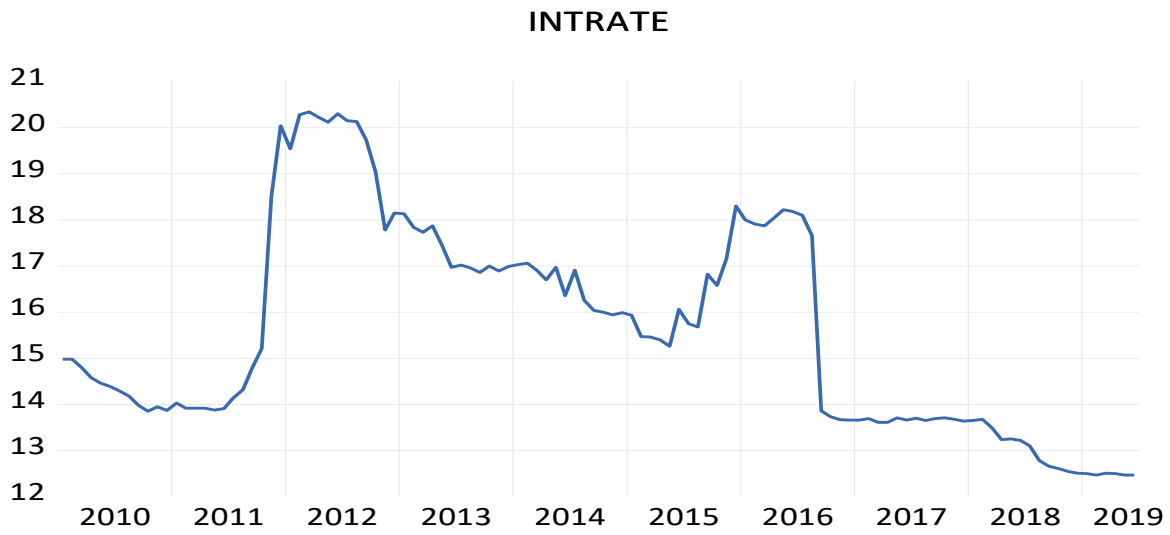
INTRATE
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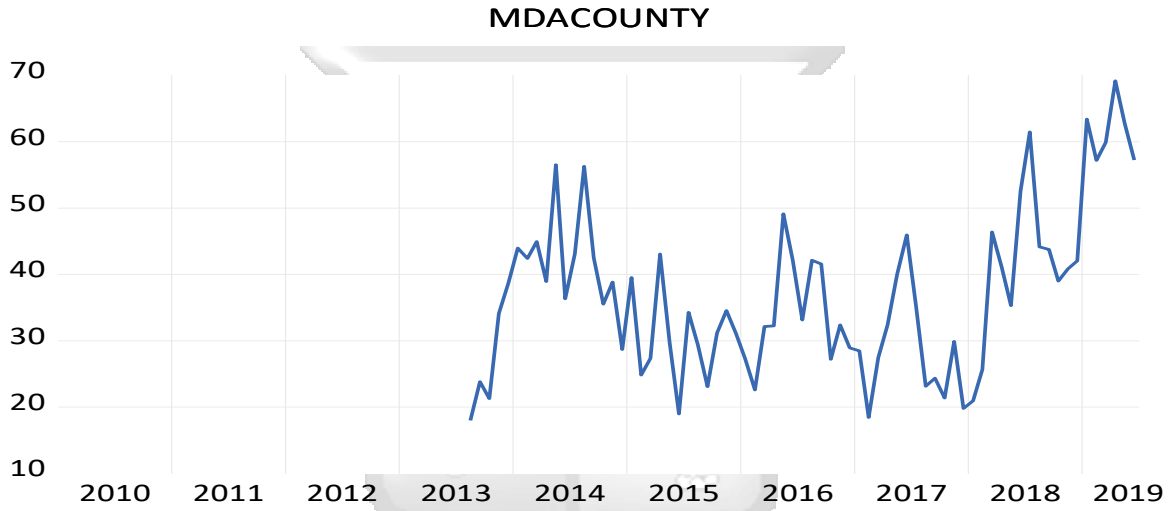
MDACOUNTY
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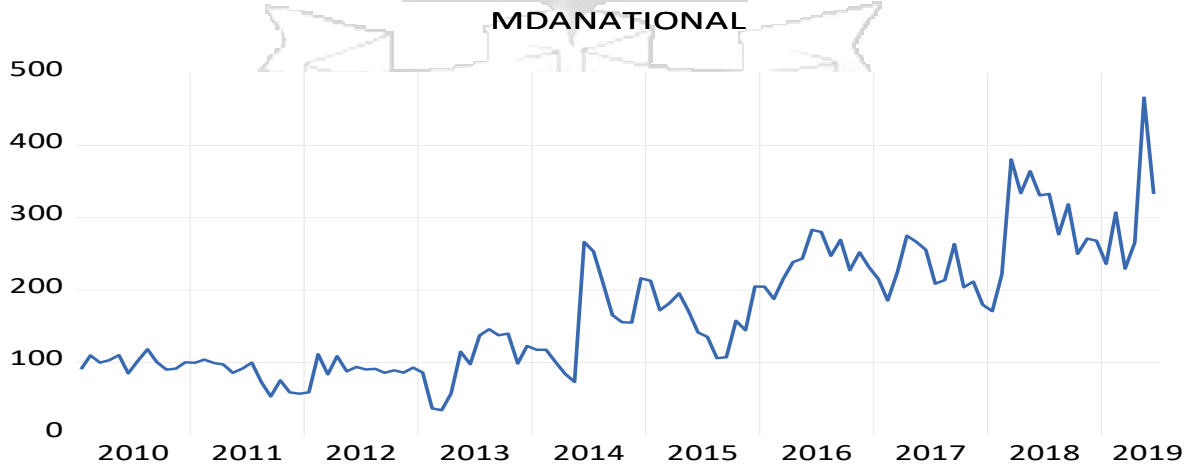
MDANATIONAL
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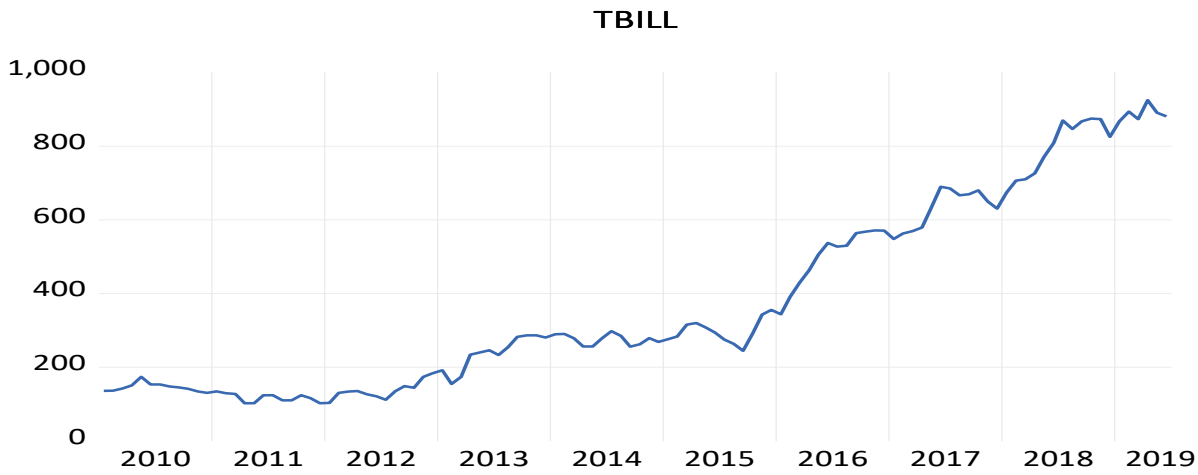
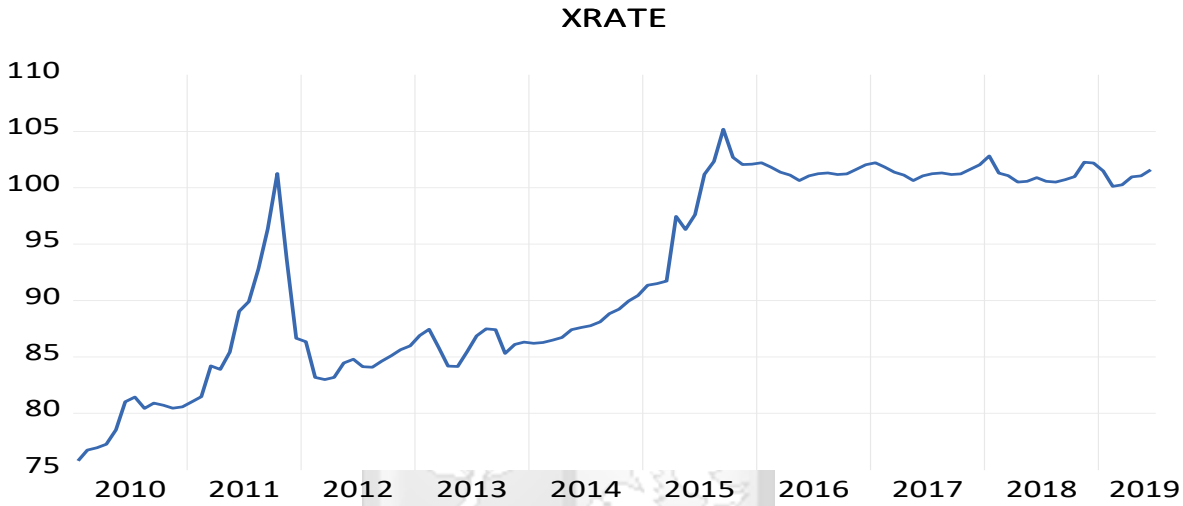




4.2 Correlation Analysis Results

To establish the level and direction of correlation among the variables of interest, below is the Correlation Analysis Results (Table 4.2). Correlation is a measure of the strength and direction of the linear relationship between any two variables. Consequently, the correlation matrix attempts to provide insights on the hypothesis tests that the study intended to test by finding out the various relationships that exist between cash management and short term debts (treasury bills and bank overdraft) and the relationship between the short term debts and exchange rate, inflation, GDP and interest rates.

It can be observed that we cannot reject the null hypothesis that there is no significant relationship between bank overdraft and cash management; bank overdraft and inflation;

bank overdraft and exchange rate; there is also significant relationship between treasury bill and cash management; treasury bill and GDP; treasury bill and inflation; treasury bill and exchange rate; and treasury bill and interest rate. More specifically, there is a positive significant relationship between bank overdraft and cash management and bank overdraft and exchange rate while there exists a negative significant relationship between bank overdraft and inflation.

In terms of treasury bill, there is positive relationship between treasury bill and cash management; treasury bill and GDP; treasury bill and exchange rate. On the other hand, there exists significant but negative relationship between treasury bill and inflation; and treasury bill and interest rate. The relationship between treasury bill and cash management and treasury bill and interest rate are very strong with coefficient value of more than 5, that is (0.88 and 0.60, respectively).

Table 4.2: Correlation Analysis Results

VARIABLE	BANKDRAFT	CASHMGT	GDP	INF	INTRATE	TBILL	XRATE
BANKDRAFT	1.00						
CASHMGT	0.28 (0.00)	1.00					
GDP	0.09 (0.36)	0.28 (0.00)	1.00				
INF	-0.15 (0.10)	-0.38 (0.00)	-0.58 (0.00)	1.00			
INTRATE	0.05 (0.57)	-0.50 (0.00)	-0.45 (0.00)	0.65 (0.00)	1.00		
TBILL	0.25 (0.01)	0.88 (0.00)	0.25 (0.01)	-0.37 (0.00)	-0.60 (0.00)	1.00	
XRATE	0.35 (0.00)	0.72 (0.00)	0.17 (0.06)	-0.19 (0.04)	-0.36 (0.00)	0.77 (0.00)	1.00

Note: The numbers in parenthesis are the probabilities

4.3 Regression Analysis

As earlier mentioned, this study employs a time series data analysis approach in order to evaluate the impact of the Cash Management policy being implemented by the National Treasury on short term domestic debt performance and to find out other determinants of short-term debts in Kenya. To do this, two equations are used as already specified in chapter three as:

$TBill_t = \alpha_0 + CashMgt_t + Exrate_t + Inf_t + GDP_t + Intrate_t + \mu_t$ …… (Equation 1)

$BankOverdraft_t = \alpha_0 + CashMgt_t + Exrate_t + Inf_t + GDP_t + Intrate_t + \mu_t$ …… (Equation 2)

Where $TBill_t$ is Treasury Bill at time t; $CashMgt_t$ is Cash Management at time t; $Exrate_t$ is Exchange Rate at time t, Inf_t is inflation at time t, GDP_t is Gross Domestic Product at time t; and $Intrate_t$+ is Interest rate at time t; while μ_t remains the stochastic error term.

To find out the impact of cash management policy on short term debts, we introduce a dummy variable taking the value of 1 and 0 where 1 is when cash management policy was operationalised and in operation, that is January 2015 to June 2019 and a value of 0 for the period when there was no cash management policy in place, that is, January 2010 to December 2014.

To respond to skewness towards large values and to show percent changes or multiplicative factors, this study uses the logs of treasury bills, bank overdraft and cash management values in our analysis.

4.3.1 Unit root test

As a requirement in time series data, the first and foremost step for this analysis, was testing stationary or non-stationarity of the data. This was vital because econometric analysis of non-stationary variables affects the efficiency and consistency of estimation results (Granger et al., 1974). Non-stationarity could arise from presence of unit root and/or trend in the data generating process. While there are a number of methods available for unit root test such as Augmented Dickey Fuller (ADF), Phillips-Perron (PP) test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS). In this analysis, we apply Augmented Dickey-Fuller (ADF) test to test presence of the unit roots as it is commonly used in most of the empirical works. The null hypothesis is that there is a unit root in data generating process. In other words, the data is not stationary. With the ADF models, there are three possible specifications. These are model without constant (c) and without trend (αt); the model with constant but without time trend and the model with both constant and time trend.

The desire is to correct for non-stationarity because use of non-stationary data in estimations yields non-sensible or spurious regression results. The null hypothesis as already mentioned is that the variable under investigation has a unit root (non-stationary) and the alternative is that it does not (Dick and Fuller, 1979). To determine the order of integration, ADF unit root test was carried out on levels and differences for variables used in this study. Where a series is found to be non-stationary at levels, it is differenced until it is stationary. To test for stationarity, the hypothesis test is

H_O: The variable is not stationary/has unit root**;**

H_A: The variable is stationary/has no unit root

The rule of the thumb is, if the absolute value of ADF is lower than the critical value, we cannot reject the null hypothesis of non-stationary. In our test for stationarity, we base our analysis at 5% significant level.

The results of the unit root test for variables used in the analysis are reported in the table below;

Table 4.3 Results of unit-root Test of the independent and dependent variables

Variable	ADF	Assumptions	Test statistic	5% critical value	Status of stationarity
LOG BANK OVERDRAFT	Level	Intercept	-5.4037	-2.889	Stationary
		Intercept & trend	-6.1701	-3.4524	Stationary
	1st difference	Intercept	-14.3663	-2.889	Stationary
		Intercept & trend	-14.2995	-3.4536	Stationary
LOG TREASURY BILLS	Level	Intercept	0.1799	-2.8817	Non-stationary
		Intercept & trend	-2.5500	-3.4501	Non-stationary
	1st difference	Intercept	-9.6377	-2.888	Stationary
		Intercept & trend	-9.6643	-3.4501	Stationary
LOG CASH MANAGMNT	Level	Intercept	-1.9073	-2.887	Non-stationary
		Intercept & trend	-4.1415	-3.450	Stationary
	1st difference	Intercept	-11.3468	-2.887	Stationary
		Intercept & trend	-11.3077	-3.454	Stationary
EXTRATE	Level	Intercept	-1.7535	-2.887	Non-stationary
		Intercept & trend	-2.7171	-3.450	Non-stationary
	1st difference	Intercept	-8.3183	-2.887	Stationary
		Intercept & trend	-8.3099	-3.450	Stationary
INFLATION	Level	Intercept	-4.4667	-2.888	Stationary
		Intercept & trend	-5.5275	-3.452	Stationary
	1st difference	Intercept	-3.1747	-2.888	Stationary
		Intercept & trend	-3.1791	3.452	Non-Stationary
GDP	Level	Intercept	-2.2479	-2.888	No-Stationary
		Intercept & trend	-2.651	-3.452	Non-stationary
	1st difference	Intercept	-5.6199	-2.888	Stationary
		Intercept & trend	-5.6478	-3.452	Stationary
INTEREST RATE	Level	Intercept	-1.4044	-2.887	Non-stationary
		Intercept & trend	-1.6085	-3.450	Non-stationary
	1st difference	Intercept	-8.5610	-2.887	Stationary
		Intercept & trend	-8.5977	-3.450	Stationary

From the table above, the results indicate that all variables are integrated of order one apart from log of bank overdraft, Cash management (intercept and trend) and inflation rate which are stationary at levels. As already mentioned, cash management is stationary at intercept and trend and not at intercept alone. Given that all other variables are integrated of order one, it implies that all the variables are stationary either at level or first difference, calling for the usage of Auto Regressive Distributive Lag (ARDL).

4.3.2 Estimation results of ARDL model

From the above test of stationarity, it is clear that the series are integrated of different orders. For example, the series is stationary both at level (I(0) and stationary after first difference (I(1**).** This means we cannot apply classical regression techniques to evaluate the

impact of the Cash Management policy being implemented by the National Treasury on short term domestic debt performance and other determinants. The variables must be transformed otherwise the regression results would be spurious. In this case, we will use Autoregressive Distributive Lag Model Bound Test in our analysis. ARDL is the standard Least squares regressions that include lags of both the dependent and independent variables as regressors (Green, 2008). In the same length ARDL are considered linear time series models in which both the dependent and explanatory variables are related not only contemporaneously but across historical (lagged) values as well. In this analysis, we used ARDL bounds test to see if the variables are cointegrated.

We started this process by finding out the optimal lag structure. This is based on the assumption that the dependence of short-term debt (bank overdraft and treasury bill) on independent variables (cash management, GDP, inflation, interest rates and exchange rates) is rarely instantaneous. In other words, it is possible that short term debt responds to the independent variables with a lapse of time (lag). The choice of lags is important because there is no rule of thumb in choice of lags and choosing many lags as is always the practice can lead to loss of degrees of freedom, cause multicollinearity, serial correlation in the error terms and misspecification errors. In this paper, the choice of maximum lags was done empirically. From the table 4.4 below, the optimal lag structure with treasury bill and bank overdraft as the dependent variables were both found to be one (1) as per the Akaike information criterion (AIC) (see the tables below).

4.4 VAR Lag Order Selection Criteria with treasury bill as the dependent variable

Endogenous variables: LTBILL

Exogenous variables: C LCASHMGT DUMMY XRATE INTRATE INF GDP

Sample: 2010M01 2019M06

Included observations: 106

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1056.79	NA	1.22928	20.07156	20.24745	20.14285
1	-281.066	1434.363	1.37E-06	6.359737*	7.766837*	6.930042*
2	-233.262	82.07945	1.41E-06	6.382293	9.020605	7.451615
3	-185.369	75.90584	1.49E-06	6.40318	10.27271	7.97152
4	-125.503	86.97412*	1.28e-06*	6.198175	11.29891	8.265531
5	-99.2645	34.65497	2.17E-06	6.627632	12.95958	9.194006
6	-49.8426	58.74676	2.50E-06	6.619672	14.18283	9.685063
7	0.026892	52.69231	3.07E-06	6.603266	15.39764	10.16767
8	49.76222	45.98172	4.16E-06	6.589392	16.61498	10.65282

* indicates lag order selected by the criterion: LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; and HQ: Hannan-Quinn information criterion

Table 4.5 VAR Lag Order Selection Criteria with Bank Overdraft as the dependent Variable

Endogenous variables: LBANKDRAFT

Exogenous variables: C LCASHMGT DUMMY XRATE INTRATE INF GDP

Sample: 2010M01 2019M06

Included observations: 89

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-958.964	NA	6.308619	21.70705	21.90279	21.78594
1	-438.135	948.0261	0.000157*	11.10415*	12.67003*	11.73531*
2	-401.918	60.22529	0.000214	11.39142	14.32745	12.57485
3	-340.433	92.57271*	0.00017	11.11086	15.41704	12.84655
4	-298.248	56.87949	0.000219	11.26399	16.94032	13.55195
5	-260.739	44.67307	0.000336	11.52222	18.5687	14.36246
6	-212.275	50.09728	0.000446	11.53428	19.9509	14.92678
7	-174.833	32.81429	0.000876	11.79401	21.58078	15.73878
8	-115.824	42.43363	0.001311	11.56908	22.726	16.06612

* indicates lag order selected by the criterion: LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; and HQ: Hannan-Quinn information criterion

4.3.3 ARDL Bounds Test of Cointegration

The next step after getting the appropriate optimal lag structure was to carry out the cointegration test using ARDL Bounds Test as developed by Pesaran (2001). According to this test, **H_O:** There is no cointegration/long-run relation; **H_A:** There is cointegration.

Dependent variable	F-statistic	At 5%		T statistic	At 5%		Cointegration	What next?
		I(0)	I(1)		I(0)	I(1)		
Log of bank overdraft	8.3690	2.62	3.79	-6.4831	-2.86	-4.19	Yes	Estimate Error Correction Model (ECM)
Log of treasury bills	0.9488	2.62	3.79	-1.2126	-2.86	-4.19	No	Estimate ARDL short run model

Bound testing approach is based on F-statistics and two critical values which are called I(0) and I(1) bound. If the F-statistics is greater than I(1) bound, the variables are cointegrated. On the hand if they are less than I(0), they are not cointegrated. If it falls in between the two it is said to be inconclusive. As it is shown in the table above, with the logarithm of bank overdraft as the dependent variable, the F-statistics from the regression in levels (8.369) is above both I(0) and I(1) at 5% level of significance (2.62 and 3.79 respectively). Thus, we can conclude that the variables are cointegrated, the series in this equation exhibit a long-run relationship implying that the series are related and can be combined in a linear fashion. In this case, we will estimate both the long-run and short-run models using ARDL and the Error Correction Model (ECM).

In equation 2 with logarithm of treasury bill being the dependent variable, the F-statistics from the regression in levels (0.9488) is below both I(0) and I(1) at 5% level of significance (2.62 and 3.79 respectively). Thus, we can conclude that the variables are not cointegrated. It implies that they have no long run relationship. Therefore, in equation 2, we will estimate ARDL short run model.

4.3.4 Estimation Regression Results

As already illustrated in the previous section, for equation 1 with log of bank overdraft as the dependent variable, we will estimate both the long-run and short-run models while in

equation 2 with the log of treasury bills as the dependent variable, only the short-run model will be applicable. We also introduced dummy variables to capture period when cash management policy was in use (1) and the periods before its introduction and thus not in use (0). To do the short-run dynamics, we specify our equation as

$$ARDL(p,q): Y_t = \beta_0 + \sum_{i=0}^{p} \beta_i Y_{t-i} + \sum_{i=0}^{q} \delta_i Y_{t-1} + \varepsilon_t$$

From the equation, the model is autoregressive because Y is the dependent variable explained by itself and the lagged values of itself. The model is also distributed lag because Y is further explained by lagged values of X. current values may also be included in the model. In our analysis, we consider the short-run terms in the case where there is no cointegration and both short-run and long-run terms in the case where cointegration exists (see the model below used in this analysis)

$$\Delta Y_t = \beta_0 + \sum_{i=0}^{p} \lambda_i \Delta Y_{t-1_i} + \sum_{i=0}^{q} \delta \Delta X_{t-1} + \phi_i Y_{t-1} + \phi_2 X_{t-1} + \nu_t$$

The Short-run results are presented in the table below.

Table 4:6 Regression results with Treasury bill as the dependent variable				
Dependent Variable: D(LTBILL)				
Method: Least Squares				
Sample (adjusted): 2010M03 2019M06				
Included observations: 112 after adjustments				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.15151	0.05679	2.66800	0.00900
D(LTBILL(-1))	0.59246	0.07989	7.41581	0.00000
D(LCASHMGT)	0.11044	0.02371	4.65767	0.00000
LCASHMGT(-1)	0.63143	0.06801	9.28505	0.00000
D(DUMMY)	0.02150	0.00980	2.19380	0.03070
D(DUMMY(-1))	0.13216	0.04081	3.23869	0.00160
D(XRATE)	-0.00320	0.00070	-4.54756	0.00000
D(XRATE(-1))	-0.02149	0.00658	-3.26639	0.00150
D(INTRATE)	-0.25241	0.10604	-2.38023	0.01940
D(INTRATE(-1))	-0.05868	0.02633	-2.22880	0.02800
D(INF)	-0.00349	0.00049	-7.17446	0.00000
D(INF(-1))	-0.02155	0.01192	-1.80852	0.07330
D(GDP)	0.00598	0.00455	1.31521	0.19160
D(GDP(-1))	0.36407	0.29197	1.24696	0.21980
Other Statistics				
R-squared	0.568263	Mean dependent var		23.25605
Adjusted R-squared	0.479702	S.D. dependent var		4.433822
S.E. of regression	3.198191	Akaike info criterion		5.330408
Sum squared resid	398.9085	Schwarz criterion		5.681258
Log likelihood	-118.9298	Hannan-Quinn criter.		5.462995
F-statistic	6.416607	Durbin-Watson stat		1.989172
Prob(F-statistic)	0.000026			

From the results, it is evident that there is short-run causal effect running from all the explanatory variables (previous treasury bills, current and previous cash management, exchange rate, interest rate and inflation), except GDP to treasury bills. The coefficient of the dummy variable is positive and significant implying that the introduction of cash management policy influences treasury bills in the short-run (detailed explanations in response to the objectives follow in section 4.7).

Similarly, for equation 2 with log of Bank overdraft as the dependent variable, the results of the estimated model in the short-run are given as follows:

Table 4.7 Regression results with bank overdraft as the dependent variable				
Dependent Variable: D(LBANKDRAFT)				
Method: Least Squares				
Sample: 2010M01 2019M06				
Included observations: 110				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.85792	1.51795	-1.88276	0.06260
D(LBANKDRAFT(-1))	0.10357	0.14920	0.69419	0.48910
D(LCASHMGT)	0.34981	0.10041	3.48403	0.00080
D(LCASHMGT(-1))	0.28365	0.12955	2.18943	0.03390
D(DUMMY)	0.03974	0.02191	1.81349	0.07320
D(DUMMY(-1))	0.05138	0.01439	3.57024	0.00050
D(XRATE)	-0.05138	0.01439	3.57024	0.00050
D(XRATE(-1))	-0.09842	0.03342	-2.94484	0.00400
D(INTRATE)	-0.02386	0.01794	-1.32970	0.18680
D(INTRATE(-1))	-0.31099	0.61334	-0.50704	0.61500
D(INF)	-0.02638	0.02492	-1.05854	0.29280
D(INF(-1))	-0.02789	0.03523	-0.79163	0.43040
D(GDP)	-0.02554	0.02888	-0.88439	0.37880
D(GDP(-1))	-0.04583	0.02804	-1.63438	0.10570
R-squared	0.886961	Mean dependent var		27.17209
Adjusted R-squared	0.866408	S.D. dependent var		0.389192
S.E. of regression	0.142251	Akaike info criterion		-0.90893
Sum squared resid	0.89035	Schwarz criterion		-0.57436
Log likelihood	33.08672	Hannan-Quinn criter.		-0.78027
F-statistic	43.15575	Durbin-Watson stat		1.982893
Prob(F-statistic)	0.000000			

From the above results, it is clear that there is short-run causal effect running from current and previous cash management, exchange rate, and interest rate to bank overdraft as a measure of short-term debt. Of interest is the fact that interest rates affect treasury bills and not bank overdraft. Nonetheless, this is in line with the economic theory. Similarly, inflation affects treasury bills and not bank overdraft as per the results of our analysis in the short-run. Again, as in the first case, the coefficient of the dummy variable is positive and significant implying that the introduction of cash management policy influences treasury bills in the short-run (more detailed explanations in response to the objectives follow in section 4.7).

4.3.5 Model Checking and Diagnostic analysis

After carrying out the short-run analysis, we also did diagnostic tests to check for serial correlation and model stability. The discussions and results are presented below

4.3.5.1 Diagnostic Test for Serial Correlation

Before proceeding with the use of results from ARDL model, estimation, it is imperative to check for serial correlation and stability. Serial correlation is a situation where the residuals are correlated. If residuals are correlated the estimations are biased and inconsistent. Two approaches exist in testing for serial correlation: Durbin Watson (DW) test and Breusch–Godfrey test or langrage Multiplier (LM) test. Since we cannot use DW test as our variables of usage are of higher order and we also used lagged dependent variable as regressor, in this analysis, we use the Breusch–Godfrey test/Langrage Multiplier (LM) test. The results is given in the table below. As can easily be seen from the table the p-value of LM statistics that is the probability of rejecting the true null is about 93% when log of bank overdraft is used and 49% for log of treasury bills. This means we cannot reject the null. Thus, there is no problem of serial correlation in these models.

Residual diagnostics: Serial correlations

Table 4.8 Diagnostic test to check for serial correlation

Dependent variable	**Log of Bank overdraft**	**Log of Treasury bills**
F-statistic	0.0085	0.4952
Prob(1,97) & Prob(1,106) respectively	0.9268	0.4859
Obs X R-Squared	0.0105	0.6175
Prob.Chi-square(1)	0.9183	0.4320
Decision	No serial correlation	No serial correlation

4.3.5.2 Test for Stability of Parameters

Another fundamental assumption of classical regression model is that the parameters remain constant across sample. In other words, the model is stable. The stability of the model is also another prerequisite for the results to be dependable. According to (Heij, Boer, Franses, Kloek, & Dijk, 2004) stability refers to the situation where the parameters

remain constant over time. In some sense stability is related to structural change. To test for this, we used the CUSUM (cumulative sum) and CUSUMSQ (Cumulative sum square) which is based on recursive regression. The CUSUM test plots both sequences of CUSUM and the critical lines for conducting CUSUM test. The graphs below (a. with bank overdraft as the dependent variable and b. with treasury bill as the dependent variable) show plots of the CUSUM and CUSMSQ tests. It indicates that both CUSUM and CUSMSQ are within 5% significance interval. Therefore, we can conclude that the model is stable.

Figure 4.1 CUSUM and CUSMSQ with log of Bank over draft as the dependent variable

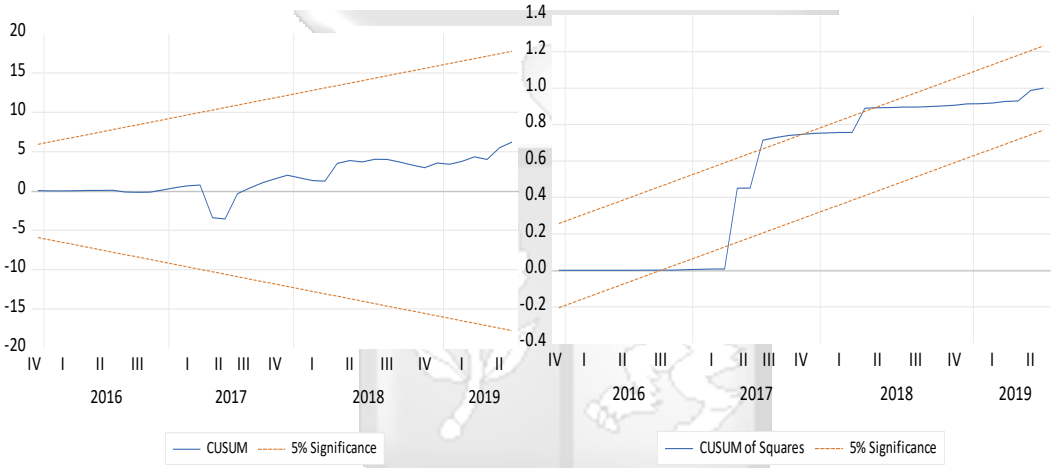
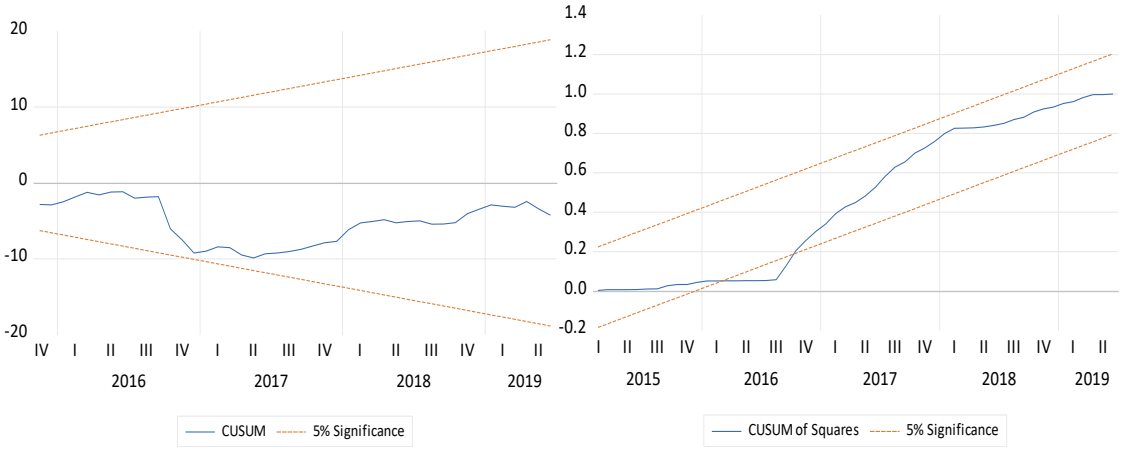


Figure 4.2 CUSUM and CUSMSQ with log of treasury bill as the dependent variable



4.4 Interpreting Results of the Short-run dynamics

As per the results of the short run analysis presented in table 4.6 and table 4.7 (treasury bill

and bank overdraft as dependent variables respectively), the results show that in the short-run previous treasury bill, current and previous cash management, exchange rate, interest rate and inflation rate affect treasury bill as a measure of short term debt in Kenya. Similarly, from the coefficient of the dummy, it is also clear that the implementation of the cash management policy by the National Treasury has impacted on the treasury bill. The evidence provided by the results show that exchange rate, interest rate and inflation negatively affect treasury bill while previous treasury bill, introduction of cash management policy and current and previous cash management positively impacts on the treasury bill. More specifically, 1% increase in past treasury bill increases treasury bill by 0.59%. A 1% increase in previous and current cash management also increases treasury bill by 0.11% and 0.63% respectively. On the other hand, 1% increase in current and previous exchange rate statistically reduces treasury bill by 0.003% and 0.02% respectively. Similarly, a 1% increase in current and previous inflation rates, reduces treasury bill by -0.03% and 0.021%. Finally, the results also reveal that 1% increase in interest rates, reduces current and previous treasury bills by 0.25% and 0.02% respectively It is important to note that the effect of the previous cash management on treasury bill is higher than all the variables that impact on treasury bill (previous treasury bill, current cash management, current and previous exchange rate and inflation rates). The adjusted R-Squared value is 0.479 implying that about 48% of the changes in treasury bill is explained by the explanatory variables in the short run. This leaves about 52% of the variations in treasury bill unexplained by the explanatory variables used in this analysis.

Table 4.7 presents the results of the short-run analysis of the determinants of short-term debt using bank overdraft as the dependent variable. From the results presented, current and previous cash management, introduction of cash management policy, current and previous exchange rate affects bank overdraft in the short-run. While previous and current exchange

rate and interest rates negatively affect bank overdraft in the short-run, current and previous cash management positively affects bank overdraft.

More specifically, the results of our findings show that a 1% increase in current and previous cash management increases bank overdraft by 0.35% and 0.28% respectively. 1% increase current and previous exchange rate reduces bank overdraft by 0.05 and 0.09 respectively. These results show that the explanatory variables explain 87% of the changes in the dependent variable (bank overdraft).

4.5 Analysis of Long run Dynamics and Speed of adjustment

4.5.1 Analysis and Interpretation of long-run Dynamics results

As it is indicated above the variables have long run equilibrium relationship when bank overdraft is used as the dependent variable. The direction of the relationship is predetermined based on existing economic theory. From the earlier equation

$$\Delta Y_t = \beta_0 + \sum_{i=0}^{p} \lambda_i \Delta Y_{t-1} \; _i + \sum_{i=0}^{q} \delta \Delta X_{t-1} + \phi_i Y_{t-1} + \phi_2 X_{t-1} + \nu_t$$

The focus on the long-run equation is on

$$\Delta Y_t = \phi_t Y_{t-1} + \phi_2 X_{t-1}$$

The long-run terms also include the error correction term. As mentioned earlier, in this analysis, only the equation with bank overdraft as the dependent variable was analyzed because of the existence of cointegration.

Table 4.9 Speed of Adjustment Analysis Results: ECM Model with Bank Overdraft as the Dependent Variable				
Dependent Variable: D(LBANKDRAFT)				
Method: Least Squares				
Sample: 2010M01 2019M06				
Included observations: 110				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.85792	1.51795	-1.88276	0.06260
D(LBANKDRAFT(-1))	0.16677	0.14950	1.11550	0.27150
D(CASHMGT)	0.04170	0.02187	1.90621	0.05950
D(LCASHMGT(-1)	0.08171	0.02594	3.14964	0.00220
D(DUMMY)	0.01522	0.00773	1.97017	0.05200
D(DUMMY(-1))	0.05138	0.01439	3.57024	0.00050
D(XRATE)	-0.00673	0.00378	-1.78086	0.07840
D(XRATE(-1))	-0.02468	0.00755	-3.26799	0.00150
D(INTRATE)	-0.24341	0.22446	-1.08446	0.28110
D(INTRATE(-1))	0.12815	0.16007	0.80064	0.42820
D(INF)	-0.10277	0.09971	-1.03067	0.30550
D(INF(-1))	0.02405	0.09875	0.24353	0.80820
D(GDP)	-0.02213	0.02608	-0.84865	0.39840
D(GDP(-1))	-0.02191	0.02583	-0.84837	0.39850
ECT(-1)	-0.60389	0.13029	-4.63516	0.00000
R-squared	0.584520	Mean dependent var		-0.003952
Adjusted R-squared	0.456680	S.D. dependent var		-0.668645
S.E. of regression	0.155763	Akaike info criterion		-0.668645
Sum squared resid	0.946222	Schwarz criterion		-0.180834
Log likelihood	30.38476	Hannan-Quinn criter.		-0.481630
Durbin-Watson stat	2.072680			

As it is indicated in table 4.9 above, Cash management affects bank overdraft positively in the long-run while exchange rate affects bank overdraft negatively. All these variables are found to be statistically significant at 5% level of significance except that current and previous exchange rate which was at 10% and 1% respectively. More particularly, the results reveal that a 1% increase in current and previous cash management leads to a 0.04% and 0.08% increase in bank overdraft. As for exchange rate, when current and previous exchange rate rises by 1%, bank overdraft decreases by 0.06% and 0.024% respectively. The dummy variable is significant and positive implying that the introduction of the cash

management policy increases the bank overdraft in the long-run. The adjusted R-Squared value is 0.584 implying that about 58% of the changes in bank overdraft is explained by the explanatory variables in the long run.

4.5.2 Speed of Adjustment Results and Its interpretations

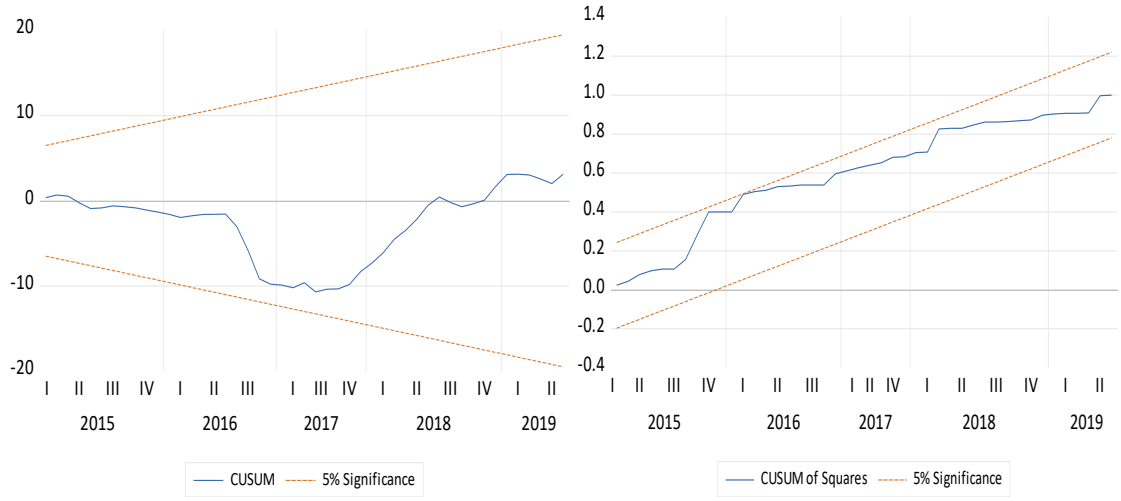
Given that cointegration exists in this equation (with bank overdraft as the dependent variable), we used the error correction term model with the key question of finding out the speed of adjustment to long run equilibrium after deviations occurred in the short run. As earlier mentioned, the error correction model assumes that at least two variables in the above equation are co-integrated (Gujarati and Porter, 2009). In this case, it is assumed that the variables which are cointegrated have a long-run relationship. This is captured by the error correction term which will specifically measure or provide the speed of adjustment towards long run equilibrium. We specify our model as:

$$Y_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta Y_{t-i} + \sum_{i=0}^{q} \beta_{2i} \Delta X_{t-1} + \lambda ECT_{t-1} + \varepsilon_t$$

The results are presented in the previous table already presented above in table 4.9. As it is revealed, the error correction term is negative as expected and significant (see the table above). The error correction term (ECT) is -0.6038 and significant at the 1% level confirming that the variables are cointegrated. It shows that the speed of adjustment is 60%. It indicates that it corrects 60% of the deviations in the previous month deviation. The ECT also shows that the rapid adjustment of bank overdraft towards its equilibrium value is 0.60 implying that there is about 60% feedback from the previous period into the short run dynamic process.

From the results, we have long-run ranger causality jointly running from cash management and exchange rate to bank overdraft. Both current and previous cash management and exchange rate have significant positive and negative coefficients respectively implying that there is a positive and a negative long-run causal effect running from cash management and

exchange rate to bank overdraft. Our model is found to be stable as presented below.



The results of our residual diagnostics also reveal that our model is free of serial correlation (see the table below)

Table 4:10 Breusch-Godfrey Serial Correlation LM Test			
Null hypothesis: No serial correlation at up to 3 lags			
F-statistic	1.659682	Prob. F(3,85)	0.1818
Obs*R-squared	5.699567	Prob. Chi-Square(3)	0.1272

4.7 How the Findings answer the research questions

As per the study objectives, this study aimed at answering three critical research questions: What is the relationship between cash management policy on short term domestic debt? How does cash management policy empirically impact on short term domestic debt in Kenya both in the short and long-run? And apart from Cash management policy, what are the other determinants of short-term domestic debt in Kenya?

Beginning from the correlation analysis results, the correlation matrix in Table 4.2 showed that there is a negative but insignificant relationship between bank overdraft and cash management with a p-value of 0.30 while there exists a weak but a significant positive relationship between cash management and treasury bill with a P-value of 0.01. Empirically, in the short-run, previous treasury bill, current and previous cash management, exchange rate and inflation have significant relationship with treasury bill. Equally, current

and previous cash management was found to significantly affect bank overdraft. In both cases the coefficient of previous cash management is higher than all other coefficients implying that while the previous cash management impacts more on the bank overdraft, the previous cash management affects more short-term debts (both treasury bill and bank overdraft). We therefore conclude in response to the first question that Cash management has positive relationship with short term debts both in the short-run and long-run dynamics.

In response to the second objective which purposed to find out cash management[1] policy (see definition under operationalization of variables) empirical impact on short term domestic debt in Kenya both in the short and long-run, the analysis was achieved through the introduction of a dummy variable which purposely aimed to provide insights on whether the introduction of cash management policy actually impacted in the change of short term debts. From the results, the study reveals that the introduction of cash management policy led to increased short-term debts both in the short-run and long-run. Particularly, in the short-run, the dummy coefficient is 0.02 implying that the introduction of cash management increased the treasury bill by 0.02%. For bank overdraft, introduction of cash management policy increased the bank overdraft by 0.03%.

Similarly, the empirical results show that a 1% increase in current and previous cash management, increased treasury bill and bank overdraft by 0.11%; 0.63% and 0.34%; 0.28% respectively. The results thus confirm that cash management does not only increase the short-term debts but the introduction of the cash management policy also increase the short-term debt in relation to the cash management. This means, the holding of idle cash by either or both national and county governments only worsen the position of short-term debts.

[1] The monthly average amount of idle cash held at the MDA and Counties bank accounts at the end of the working day

In attempting to address question three, this study looked at the relationship between short term debts (bank overdraft and treasury bill) with GDP, exchange, inflation and interest rates. The purpose was to find out which of these variables influences treasury bill and bank overdraft as measures of short-term debts in Kenya. While this was also achieved by looking at the correlational analysis results, the regression analysis was confirmatory and sufficient test. As depicted by the correlation matrix (Table 4.2), there was a pointer to the evidence of positive relationship between GDP and bank overdraft with a P-value of 0.00. On the contrary, there was a negative significant relationship between inflation and bank overdraft. The results also show that there was a significant negative relationship between treasury bill and exchange, inflation and interest rates with a P-value of 0.00, 0.03 and 0.00 respectively.

Satisfactory results from the empirics however showed that apart from cash management, previous treasury bill, current and previous exchange rate, interest rates and inflation significantly affected treasury bills. The introduction of cash management policy as depicted by the dummy variable was also found to be a big step in impacting on the short-term debts in Kenya. While exchange rate remains an important determinant of bank overdraft, inflation and interest rates were not found to statistically determine bank overdraft. Directionally, cash management positively impacts on both treasury bill and bank overdraft. Exchange rate reduces treasury bill and bank overdraft while inflation and interest rates redusces treasury bill but have no effect on bank overdraft.

The results therefore show that in addition to cash management, the other determinants of short-term debt in Kenya are exchange rates, inflation and interest rates (treasury bill) and cash management and exchange rates (bank overdraft). Introduction of the cash management policy by the national treasury was a milestone in the management of the short-term debts in Kenya. In terms of way forward, if management of short-term debts in

Kenya is to be achieved, monitoring of current and previous cash management, exchange rates, interest rates, inflation rates and implementation of the cash management policy by the national treasury are vital.

CHAPTER FIVE

DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the detailed discussion of the study findings, conclusion and policy recommendations based on the findings of the study. The discussion is made on each of the study objectives built under the broad objective which was to evaluate the impact of the Cash Management policy being implemented by the National Treasury and other determinants (exchange rate, interest rate, inflation rate and GDP) on short term domestic debt performance. Also presented in this chapter is the limitation of the study and areas of further research.

5.2 Discussion of Research Findings

The section highlights the findings of the study based on the specific research objectives. The specific research objectives were: to determine the relationship between cash management policy and short-term domestic debt in Kenya; to empirically investigate the long-run and short-run impacts of cash management policy on short term domestic debt in Kenya; and to establish other determinants of domestic short-term debt besides cash management policy in Kenya

5.2.1 To determine the relationship between cash management policy and short-term domestic debt in Kenya

From the correlation analysis results of the study, cash management is found to have positive and significant relationship with treasury bill (coefficient 0.37 probability 0.01) while it has an insignificant negative relationship with bank overdraft (coefficient -0.14 and probability 0.30). This is in line with the three theories in this study: classical, Keynesian and debt management. For example, as stated in Keynesian theory, cash management

policies are critical to governments in the management of financial crises. In essence, the existence of cash management policies calls for prior budgeting and cash management interventions that allow for equal distribution of available cash.

Classical economists also indicate that proper cash management practices enable governments to generate government savings through accurate understanding of management of liquid financial assets and deficits. Similarly, debt management theory postulates that monetary policy and debt management themes must be harmonized for effective debt management. According to this theory, cash management is a vital component of monetary policy.

Based on the foregoing, it is clear that cash management has a significant relationship with both treasury bill and bank overdraft. Like past studies (Ahmed, 2016; Mario et al., 2012; Mike et al., 2014; and Alta, 2006), cash management has positive relationship with short term debts, meaning that an effective cash management policy is integral in managing short debt debts. More particularly, our finding is in line with Mario et al., (2012) which underscores the importance of integrating cash management and monetary policy into a broader macroeconomic framework of analysis that ensures a consistent policy mix. This argument was later in Mike et al., (2014) confirmed as they argued that cash management can be used to smoothen the effects of a financial crisis. These past studies conform to our findings demonstrated by the positive and significant coefficient of the dummy variable representing a period under which cash management policy was introduced.

In a clearer view, the findings show that if we keep more idle resources, there is increased appetite to take more short-term debts to bridge the financing gap of subsequent months. This partly affirms the classical economists' argument of governments' good cash management practices that maximize the use taxes for current expenditures.

5.2.2 To empirically investigate the long-run and short-run impacts of cash management policy on short term domestic debt in Kenya

The second objective of the study was to use econometrics to illustrate the short-run and long-run effect of cash management on domestic debt. The study findings in this paper revealed that in the short-run, previous and current cash management have positive and significant relationship with the two measures of short-term debts (treasury bill and bank overdraft). The introduction of cash management policy represented in a dummy variable with one (1) representing the period under which the policy was in implementation and zero (0) the period under which no policy existed shows that the introduction and implementation of the cash management policy affects the short-term debts in Kenya. The findings also show that previous cash management is responsive to treasury bill and bank overdraft.

In the short-run a 1% increase in the current and previous cash management increases short-term debts by 0.11% and 0.63% for treasury bills and by 0.034% and 0.28% for bank overdraft. In the long run, current and previous cash management is also found to positively impact on the short-term debts (bank overdraft). For example, a 1% increase in current and previous cash management will increase bank overdraft by 0.64% and 0.08% respectively.

These findings are in line with those of Paul et al., (2016) who argued for a weak cash management function at the Kenya National Treasury coming against a backdrop of widening fiscal deficit and an increasing appetite for domestic debt financing by the National Treasury.

This study finding is supported by the classical theory in a study by Cangiano et al. (2013), who argued that debt management and cash management are most often viewed as two sides of the same coin moving in the same direction. Simply put, Cangiano et al. (2013), posits that cash management as a policy tool that impacts on short-term debts positively. This was also the case with Keynesian theory which argue that lack of good cash management

practices may plunge countries into terrible inflation and financial crises. Therefore, fiscal and monetary policies should regulate public borrowings visa vis public expenditures. To serve the intended purpose of increasing national income, public debts should be able to induce demand that leads to income generation.

From these results, and past study findings, the implication is that keeping of idle cash balances by various government ministries, agencies and departments is a precursor to increasing short term debts (both treasury bills and bank overdraft). Thus, idle cash balances must be avoided by MDAs and a mopping mechanism put in place to address the negative impact on short term debts.

5.2.3 To establish other determinants of domestic short-term debt besides cash management policy in Kenya

The final objective of this study was to find out other determinants of short-term debt and their impacts. From our results, exchange rate and inflation and interest rates are found to determine treasury bills while exchange rates determine bank overdraft. In this case, exchange rate is found to determine both measures of short-term debt while inflation and interest rates are only found to affect treasury bills and not bank overdraft. The study statistical results suggested the existence of a significant negative relationship between exchange rate and short-term debts implying that there is a negative short-run causal effect running from exchange rate to treasury bill and bank overdraft. Inflation and interest rates negatively affect the treasury bills but have no effects on bank overdrafts.

Though not statistically significant, the study revealed that GDP positively affect treasury bills while it negatively affects bank overdraft. Without considering the significance level, this relates to the Keynesian theory which argued that that public debts are national assets rather than liabilities and is correlated it to economic growth.

In this context, Keynesian theory disapproved the claims of classical theory by putting into account lack of full employment and the possible productive nature of government projects. Thus, the theory denies that public debt becomes a burden to future generations but that they also inherit assets due to the public borrowings (Boyer, 2012). According to Stockhammer (2016), effective demand induced by public borrowings determines the level of output in the wake of unemployment.

The study findings on the effect of GDP on Short term debt is supported by evidence in the previous research in Kenya and other growing economies particularly, Sub-Saharan Africa by Onogbosele et al (2016), whose study revealed no evidence that domestic debt plays an important role in the economic growth. Similarly, our findings also conform to those by Rahman, (2012), which revealed no significant relationship between inflation and short-term debts. The same was also true for GDP growth which was found to have insignificant relationship with short term debts.

Further, the evidence provided by our study results points to the fact that past historical data (previous values of variables) and behaviours plays a role on short term debts. For example, there exist significant negative short-run and long-run relationships between previous exchange rate and short-term debts (treasury bills and bank overdraft). This is also true for previous cash management, previous inflation and interest rates for treasury bills.

Like the studies by Ehikioya & Asin (2014), our study proves that exchange rate is a key determinant of short-term debt. As per the negative relationship it exhibits in relation to short term debt, we can conclude that Kenya has a strong currency as previous studies show that countries with strong currencies, will have a negative relationship between exchange rate and short-term debts or debts in general (Awan, Anjum & Rahim (2015). The same finding was revealed by Benedict et al., (2014) who found that exchange rate is a key determinant of domestic debt. Based on the movement in the foreign exchange rate, it is

possible to define the competitiveness of the domestic currency in the global market. For example, countries with a strong currency tend to inverse relationships with the level of indebtedness.

The negative significant relationship between interest rates and treasury bills is the same with classical theory proponents who do not support borrowing because through it the government creates a debt burden on future generations by destroying their capital through borrowing (Woodford et al., 2005). The burden on the future generations is in terms of repaying the loans plus the hefty interests incurred. This theory posits that a country can be rich without borrowing. Fischer and Easterly (1990) underscored that borrowing domestically in order to finance fiscal deficit can increase interest rates and lead to a debt crisis. This position is supported by Vincent et al. (2000) who used a panel data set of real time OECD budget projections in nineteen countries for twenty years, to reveal that a narrowing government debt has the implication of falling real interest rates.

On the contrary, a study by Kariuki, (2013) on determining the relationship between domestic debt and interest in Kenya, showed that there was a positive relationship between domestic debt and interest rate, thus domestic debt positively affects the interest rate in Kenya. Without clear explanations on the direction of effect, a recent study by Adetokunbo et al., (2019), in Nigeria confirmed that long run relationship exists between domestic debt and interest rate among other variables such as domestic debt, budget deficit, financial deepening indicator, external debt and GDP growth rate.

The negative relationship between interest rates and treasury bills revealed in this study shows that when interest rates rise, treasury bills rate falls and when interest rates fall, treasury bills rise. As explained earlier, interest rate is a monetary policy action by the Central Bank that affect the flow of money in the economy and influences short-term treasury bills.

5.2 Conclusions

This study has evaluated the impact of the Cash Management policy being implemented by the National Treasury and other determinants on short term domestic debt performance in Kenya over the period of January 2010 to June 2019, in the short run and long run perspectives using monthly data. It employed the ARDL Bounds Test as developed by Passaran (2001). This test provided for techniques of co-integration and error correction modelling proposed after providing for mechanisms to deal with the problems of unit root faced in time series data. The ARDL method has been mostly favored and used in the past owing to its merits of flexibility, interpretability, eloquence, and statistical properties that are explained in the previous chapter.

The specific objectives in this paper revolved around evaluating the relationship and the impact of cash management on short-term debts measured by treasury bills and cash management. The other key specific objective was to find out the determinants of short-term debts, then, based on the results achieved, provide policy recommendations. The last specific objective of policy recommendations is dealt with in the next sub-section in this chapter. The evidence in this study supports the view that in the long run, cash management affects bank overdraft positively while exchange rate affects bank overdraft negatively. In terms of responsiveness, cash management policy is more responsive to both treasury bill and bank overdraft than all other determinants.

Applying the general to specific approach using the ARDL bound Test; our statistical results suggested the existence of a significant negative inflation, interest and exchange rate coefficient implying that there is a negative short-run causal effect running from inflation, interest and exchange rates to treasury bill. In addition, the evidence provided by the results points to the fact that past historical data and behaviours play a role on short term debts (both treasury bill and bank overdraft). This is evidenced by the findings which show that

previous treasury bill, cash management, exchange rate, interest rates and inflation rates affect treasury bills while previous cash management and exchange rate affect bank overdraft.

The error correction term illustrating the speed of adjustment indicate that that the speed of adjustment is 60% showing that about 60% of the deviations of the long-run equilibrium is corrected each period. Thus, there is about 60% feedback from the previous period into the short run dynamic process.

5.3 Recommendations

Based on the findings of this study, the following recommendations are provided:

The National Treasury's objective of Cash Management implementation meant to reduce short term and unplanned budget funding deficits that are often bridged through domestic short-term borrowings will be achieved by ensuring that both the national and county governments do not hold huge daily idle cash balances. Consequently, close monitoring and system should be put in place to ensure daily mopping of such balances by both the national and county governments.

In addition to cash management, short term domestic debt and borrowing levels can further be maintained at optimal levels by ensuring macroeconomic stability. Particularly, policy makers at National Treasury must continue with the pursuit of macroeconomic stability keeping exchange rates, interest rates and inflation rates stable.

In making policy decisions concerning key macroeconomic variables, sustainability and consideration of the future prosperity should be considered as historical data affects short term debts. By doing this, the future generations will not suffer the mistakes of current and past policy makers.

5.4 Areas for Further Research

As elaborated in the first chapter of this work, the results of this study present a foundation upon which various studies particularly in Kenya can focus on in establishing the relationship between cash management policy and short-term debts. Possible attempts could be made by using different data sets such as quarterly, annual and or panel data comparing Kenya with other countries or, and focusing on different county effects in Kenya.

An interesting study that would add more value in the future would be a focused study that would find out the buffer amount of cash required to be held by CBK as cash management to minimize the demand on short-term debt.

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APPENDIX 1: FINAL DATA USED FOR ANALYSIS

Year	Month	Sample/ Observations	Treasury bill	Bank overdraft	National MDA	County MDA	Exchange Rate	Inflation Rate	GDP Growth	Interest Rate	Total MDA	Dummy
2010	January	1	135.69	9.18	90.40		75.79	8.64	4.90	14.98	90.40	0
	February	2	136.24	9.18	109.44		76.73	7.88	5.75	14.98	109.44	0
	March	3	142.07	0.54	99.72		76.95	7.03	6.60	14.80	99.72	0
	April	4	150.40	5.87	103.17		77.25	6.32	6.18	14.58	103.17	0
	May	5	173.64	10.20	109.99		78.54	5.85	6.89	14.46	109.99	0
	June	6	152.97	17.65	84.71		81.02	5.43	7.60	14.39	84.71	0
	July	7	152.62	15.51	102.01		81.43	5.03	5.72	14.29	102.01	0
	August	8	147.24	22.93	118.13		80.44	4.69	3.84	14.18	118.13	0
	September	9	144.77	20.56	100.48		80.91	4.40	7.90	13.98	100.48	0
	October	10	140.87	19.96	90.05		80.71	4.12	5.87	13.85	90.05	0
	November	11	133.83	22.93	91.17		80.46	4.02	8.74	13.95	91.17	0
	December	12	130.33	22.67	100.03		80.57	3.96	11.60	13.87	100.03	0
2011	January	13	133.85	17.63	99.50		81.03	3.93	2.42	14.03	99.50	0
	February	14	129.24	22.93	103.87		81.47	4.05	4.96	13.92	103.87	0
	March	15	126.96	19.91	99.11		84.21	4.49	7.50	13.92	99.11	0
	April	16	101.89	22.93	97.21		83.89	5.20	3.74	13.92	97.21	0
	May	17	102.12	22.93	85.62		85.43	5.96	5.17	13.88	85.62	0
	June	18	123.53	7.57	91.23		89.05	6.88	6.60	13.91	91.23	0
	July	19	123.47	19.93	99.74		89.90	7.88	1.18	14.14	99.74	0
	August	20	109.99	25.37	72.74		92.79	9.00	3.64	14.32	72.74	0

	September	21	109.76	25.37	52.92		96.36	10.18	6.10	14.79	52.92	0
	October	22	123.54	25.37	75.19		101.27	11.49	4.87	15.21	75.19	0
	November	23	115.67	25.37	58.65		93.68	12.82	4.64	18.51	58.65	0
	December	24	101.90	25.37	56.65		86.66	14.02	4.40	20.04	56.65	0
2012	January	25	102.80	25.37	58.52		86.34	15.10	-5.42	19.54	58.52	0
	February	26	130.21	25.37	111.29		83.18	15.93	-0.61	20.28	111.29	0
	March	27	133.52	25.37	83.25		83.00	16.45	4.20	20.34	83.25	0
	April	28	134.82	25.37	108.51		83.19	16.50	1.80	20.22	108.51	0
	May	29	126.22	25.37	87.56		84.46	16.40	3.05	20.12	87.56	0
	June	30	120.82	7.26	93.69		84.79	15.97	4.30	20.30	93.69	0
	July	31	111.25	25.37	90.19		84.14	15.27	0.38	20.15	90.19	0
	August	32	134.56	17.72	90.99		84.08	14.33	2.69	20.13	90.99	0
	September	33	148.18	25.37	85.44		84.61	13.29	5.00	19.73	85.44	0
	October	34	143.93	25.37	89.05		85.11	12.04	3.85	19.04	89.05	0
	November	35	173.58	25.37	85.73		85.63	10.67	4.27	17.78	85.73	0
	December	36	183.49	25.37	92.73		85.99	9.38	4.70	18.15	92.73	0
2013	January	37	191.51	25.10	85.75		86.90	8.20	1.54	18.13	85.75	0
	February	38	154.23	25.37	36.52		87.45	7.24	3.82	17.84	36.52	0
	March	39	173.66	25.37	33.94		85.82	6.33	6.10	17.73	33.94	0
	April	40	233.72	34.19	56.87		84.19	5.61	4.96	17.87	56.87	0
	May	41	239.56	34.19	114.59		84.15	4.96	6.23	17.45	114.59	0
	June	42	245.48	7.00	97.37		85.49	4.56	7.50	16.97	97.37	0
	July	43	232.60	15.49	137.07		86.86	4.44	1.03	17.02	137.07	0
	August	44	254.53	32.72	145.75	18.00	87.49	4.50	3.72	16.96	163.75	0

	September	45	282.06	34.19	137.47	23.82	87.41	4.75	6.40	16.86	161.29	0
	October	46	286.00	27.98	139.62	21.26	85.31	5.05	5.06	17.00	160.88	0
	November	47	286.00	34.19	98.28	34.10	86.10	5.39	4.28	16.89	132.38	0
	December	48	280.35	34.19	122.51	38.75	86.31	5.72	3.50	16.99	161.26	0
2014	January	49	288.92	22.47	117.50	43.97	86.21	6.01	3.89	17.03	161.47	0
	February	50	290.34	34.19	117.50	42.40	86.28	6.21	4.54	17.06	159.90	0
	March	51	278.40	34.19	100.42	44.95	86.49	6.39	5.20	16.91	145.37	0
	April	52	256.17	34.19	84.22	38.92	86.72	6.58	4.87	16.70	123.14	0
	May	53	255.84	39.12	73.04	56.52	87.41	6.85	5.44	16.97	129.56	0
	June	54	278.92	37.24	266.23	36.32	87.61	7.05	6.00	16.36	302.55	0
	July	55	297.32	31.66	253.22	43.08	87.77	7.19	5.72	16.91	296.30	0
	August	56	284.56	30.38	209.28	56.31	88.11	7.33	5.16	16.26	265.59	0
	September	57	255.58	34.37	165.23	42.50	88.84	7.19	4.60	16.04	207.73	0
	October	58	262.07	18.30	155.46	35.52	89.23	7.08	4.88	16.00	190.98	0
	November	59	278.78	22.56	154.95	38.84	89.96	6.97	5.24	15.94	193.79	0
	December	60	268.51	30.93	216.06	28.69	90.44	6.88	5.60	15.99	244.75	0
2015	January	61	275.78	27.49	212.70	39.54	91.36	6.74	6.00	15.93	252.24	1
	February	62	283.41	34.20	171.95	24.84	91.49	6.63	5.85	15.47	196.79	1
	March	63	315.47	37.40	181.88	27.34	91.73	6.63	5.70	15.46	209.22	1
	April	64	319.92	29.77	195.41	43.07	97.46	6.69	6.11	15.40	238.48	1
	May	65	307.96	21.09	171.02	29.71	96.30	6.65	5.66	15.26	200.73	1
	June	66	293.53	36.49	141.29	18.96	97.61	6.63	5.60	16.06	160.25	1
	July	67	274.96	41.68	135.17	34.28	101.20	6.54	5.24	15.75	169.45	1
	August	68	262.89	46.08	105.71	29.35	102.34	6.34	5.73	15.68	135.06	1

	September	69	244.36	45.92	107.10	23.09	105.18	6.29	6.10	16.82	130.19	1
	October	70	291.16	36.87	157.34	31.16	102.69	6.31	5.97	16.58	188.50	1
	November	71	342.41	36.50	144.23	34.55	102.05	6.42	5.92	17.16	178.78	1
	December	72	355.33	45.23	204.72	31.07	102.09	6.58	5.50	18.30	235.79	1
2016	January	73	343.45	35.67	204.68	27.23	102.21	6.77	6.09	18.00	231.91	1
	February	74	391.01	43.58	187.84	22.59	101.83	6.87	5.50	17.91	210.43	1
	March	75	429.23	46.46	215.56	32.14	101.39	6.88	5.00	17.87	247.70	1
	April	76	462.92	44.87	238.67	32.23	101.13	6.72	5.40	18.04	270.90	1
	May	77	505.56	44.24	243.38	49.12	100.64	6.59	5.64	18.22	292.50	1
	June	78	537.28	44.20	283.01	42.12	101.05	6.46	6.20	18.18	325.13	1
	July	79	526.98	14.01	280.06	33.14	101.24	6.44	5.97	18.10	313.20	1
	August	80	529.76	13.28	247.17	42.13	101.31	6.47	5.64	17.66	289.30	1
	September	81	563.82	3.32	269.18	41.56	101.17	6.50	5.20	13.86	310.74	1
	October	82	567.90	0.00	227.26	27.19	101.23	6.48	5.20	13.73	254.45	1
	November	83	571.15	12.67	251.92	32.40	101.65	6.43	5.70	13.67	284.32	1
	December	84	570.85	29.93	231.99	28.91	102.04	6.30	7.20	13.66	260.90	1
2017	January	85	547.74	17.30	215.14	28.46	102.21	6.26	5.20	13.66	243.60	1
	February	86	562.52	26.00	185.54	18.44	101.83	6.43	5.17	13.69	203.98	1
	March	87	568.92	30.27	224.35	27.46	101.39	6.76	5.20	13.61	251.81	1
	April	88	578.90	0.00	274.94	32.40	101.13	7.20	5.14	13.61	307.34	1
	May	89	633.01	0.00	266.61	40.01	100.64	7.84	4.87	13.71	306.62	1
	June	90	689.57	0.00	255.43	45.97	101.05	8.13	4.50	13.66	301.40	1
	July	91	685.11	9.21	208.72	35.20	101.24	8.21	4.63	13.70	243.92	1
	August	92	666.38	21.19	213.79	23.14	101.31	8.36	4.57	13.65	236.93	1

	September	93	669.16	24.72	263.36	24.37	101.17	8.40	4.50	13.69	287.73	1
	October	94	679.92	17.38	203.73	21.35	101.23	8.33	4.66	13.71	225.08	1
	November	95	649.70	40.66	211.39	29.91	101.65	8.15	4.66	13.68	241.30	1
	December	96	630.39	42.32	179.54	19.79	102.04	7.98	5.30	13.64	199.33	1
2018	January	97	673.74	29.92	170.75	20.95	102.82	7.79	5.08	13.65	191.70	1
	February	98	706.57	46.21	221.52	25.65	101.30	7.40	5.81	13.68	247.17	1
	March	99	710.07	39.66	380.29	46.40	101.08	6.89	6.60	13.49	426.69	1
	April	100	726.07	44.03	334.03	41.17	100.51	3.73	6.26	13.24	375.20	1
	May	101	770.98	44.35	363.98	35.29	100.57	5.61	6.36	13.25	399.27	1
	June	102	808.23	56.85	330.63	52.52	100.90	5.20	6.40	13.22	383.15	1
	July	103	869.55	26.34	332.80	61.48	100.57	4.95	6.16	13.10	394.28	1
	August	104	846.77	15.06	276.91	44.15	100.51	4.63	6.39	12.78	321.06	1
	September	105	867.51	36.29	318.36	43.77	100.73	4.53	6.40	12.66	362.13	1
	October	106	874.78	25.17	250.12	38.99	100.98	4.53	6.60	12.61	289.11	1
	November	107	873.16	44.89	270.92	40.82	102.26	4.59	6.28	12.55	311.74	1
	December	108	825.45	64.82	268.10	42.04	102.19	4.69	5.90	12.51	310.14	1
2019	January	109	867.54	36.89	236.07	63.40	101.49	4.68	6.23	12.50	299.47	1
	February	110	893.65	19.67	307.04	57.19	100.13	4.65	5.83	12.47	364.23	1
	March	111	873.22	36.90	229.59	59.90	100.26	4.67	5.60	12.51	289.49	1
	April	112	924.55	13.78	265.44	69.19	100.97	4.91	5.57	12.50	334.63	1
	May	113	890.86	35.97	465.71	62.76	101.05	5.04	5.90	12.47	528.47	1
	June	114	880.86	57.33	332.76	57.23	101.59	5.16	5.60	12.47	389.99	1

APPENDIX 2: LOGS OF EVIEWS COMMANDS

```
wfopen "C:\Users\\finalised data for analysis-njeru 06-07-2020.wf1"
lbankdraft.sheet
lbankdraft.uroot
close LBANKDRAFT
close INTRATE
gdp.sheet
gdp.uroot
gdp.uroot(dif=1)
close GDP
inf.sheet
inf.uroot
close INF
intrate.sheet
intrate.uroot
intrate.uroot(dif=1)
close INTRATE
xrate.sheet
xrate.uroot
xrate.uroot(dif=1)
close XRATE
ltbill.sheet
ltbill.uroot
ltbill.uroot(dif=1)
close LTBILL
lcashmgt.sheet
lcashmgt.uroot
lcashmgt.uroot(dif=1)
{%var}.ls 1 2 lbankdraft lcashmgt dummy xrate intrate inf gdp
{%var}.results
{%var}.laglen(8)
{%var}.ls 1 2 ltbill lcashmgt dummy xrate intrate inf gdp
{%var}.results
{%var}.laglen(8)
{%equation}.ardl(deplags=1, reglags=1, trend=uconst) lbankdraft lcashmgt dummy xrate
intrate inf gdp @
{%equation}.ardl(deplags=1, reglags=1, trend=uconst) lbankdraft lcashmgt dummy xrate
intrate inf gdp @
{%equation}.cointrep
{%equation}.ardl(deplags=1, reglags=1, trend=uconst) ltbill lcashmgt dummy xrate intrate
inf gdp @
{%equation}.cointrep
{%equation}.auto
{%equation}.rls(q) c(1) c(2) c(3) c(4) c(5) c(6) c(7) c(8) c(9)
{%equation}.rls(v) c(1) c(2) c(3) c(4) c(5) c(6) c(7) c(8) c(9)
{%equation}.ardl(trend=uconst) ltbill lcashmgt dummy xrate intrate inf gdp @
{%equation}.auto
{%equation}.reset
```

{%equation}.rls(q) c(1) c(2) c(3) c(4) c(5) c(6) c(7) c(8) c(9) c(10) c(11) c(12) c(13) c(14)
{%equation}.rls(v) c(1) c(2) c(3) c(4) c(5) c(6) c(7) c(8) c(9) c(10) c(11) c(12) c(13) c(14)
{%equation}.ls d(ltbill) c d(ltbill(-1)) d(lcashmgt) d(lcashmgt(-1)) d(dummy) d(dummy(-1)) d(xrate) d(xrate(-1)) d(intrate) d(intrate(-1)) d(inf) d(inf(-1)) d(gdp) d(gdp(-1))
{%equation}.ls d(lbankdraft) c d(lbankdraft(-1)) d(lcashmgt) d(lcashmgt(-1)) d(dummy) d(dummy(-1)) d(xrate) d(xrate(-1)) d(intrate) d(intrate(-1)) d(inf) d(inf(-1)) d(gdp) d(gdp(-1))
{%equation}.makeresids ect
{%equation}.ls d(lbankdraft) c d(lbankdraft(-1)) d(lcashmgt) d(lcashmgt(-1)) d(dummy) d(dummy(-1)) d(xrate) d(xrate(-1)) d(intrate) d(intrate(-1)) d(inf) d(inf(-1)) d(gdp) d(gdp(-1)) ect(-1)