DETERMINANTS OF LOCAL REVENUE GENERATION IN NAIROBI CITY COUNTY

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Declaration

I state that the study is my original material and has not been submitted to any institution or review body for examination.

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X50/8137/2017

Approval

This thesis was presented for examination with my authorization as the supervisor.

Signature....................................   Date...

Name: Dr. Martine Oleche

Acknowledgement

Dedication

To my friends, loving family, my teachers and lecturers.

Acronyms and Abbreviations

ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criteria
ARDL	Autoregressive Distributed Lag
CoG	Council of Governors
CRA	Commission of Revenue Allocation
ECM	Error Correction Model
ECT	Error Correction Term
GDP	Gross Domestic Product
HQC	Hannan-Quinn criterion
KES	Kenya Shillings
KLRC	Kenya Law Reform Commission
LM	Lagrange multiplier
OLS	Ordinary Least Squares
PFM /PFMA	Public Finance Management Act
SBIC	Schwarz's Bayesian Information Criterion

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Abstract

The biggest challenge that county governments in Kenya face is the question of raising enough money to finance goods and services required by the taxpayers. Local revenue, also known as own-source revenue, can play a very critical role in meeting such demands. Taxpayers pay money in exchange for goods and services received from the county government. This study examined the determinants of local revenue generation in Nairobi City County. It identified the sources of local revenue, their profiles, trends, determinants and their short and long-run relationships. Main variables examined were the county level of debt, county government human resource capacity, inflation, information technology, infrastructure and exchange rates. The theories examined were the ability to pay approach, theory of fiscal policy, theory X and theory Y and the benefit principle. Published monthly time series data were collected from Nairobi City County publications, office of controller of budgets, budget speeches, Central Bank of Kenya and Kenya National Bureau of Statistics for financial year 2013-2018. Empirical results suggested that human resource capacity, debt, information technology and infrastructure positively impact local revenue. Exchange rate and inflation negatively affect local revenue in Nairobi City County.

CHAPTER ONE: INTRODUCTION

1.1 Introduction and Background of the Study

Local revenue is a foundation of local finance. These are revenues collected by county/local government/municipality from sources within its jurisdiction. These include taxes, fees and charges that local residents pay in exchange for goods and services and this whole process is guided by rules and mandates. External revenue comes from external sources, in many cases, from the national government or external entity (Alo, 2012, UN-Habitat, 2017).

Revenue is required for the operation of any institution and its' importance to local governments cannot be over-emphasized. Local revenue indicates the richness and wealth of the county in terms of its available resources and this can be used to compare wealth, size, growth and poverty levels of different local governments. It is also a key indicator of subnational government's fiscal autonomy, to generate revenue enough to sustain itself and be independent of the national government. Local revenue level shows the potential of the local government to provide for its' local residents in terms of catering for their socio-politico-economic interests. This means providing infrastructure, water, sanitation, urban services, development, education, and health care, all of which are indispensable, for they improve economic productivity and lives of county taxpayers.   revenue also determines spending capacity, taxes, debts and deficits. It increases the overall budget available to the local governments therefore improving the creditworthiness and the ability of local governments to cooperate with the private sector for service delivery purposes (Farvacque and Mihaly, 2014)

How does the local government generate revenue? From sources including; fines, special assessments, payment in lieu of taxes, royalties, rent, user fees, land use fees, utility and service charges. To introduce any new revenue source such as a fee or charge, the local government should consider three important factors; the legal, technical and political factors. Technical factors include the administration, collection and enforcement requirements and they include tools, technical knowledge and mechanisms that are put in place for a functioning revenue collection system. The legal frameworks are the deriving authority from which new revenue sources are established and they include by-laws, policies, constitutional or statutory reforms. There should also be a political

will to implement and this is the buy-in from the local residents and all stakeholders concerned (Ambetsa,2014).

The significance of revenue to the local government cannot be overstated, and there is a need to identify what factors affect the generation of these revenues. In literature, most factors have been studied on the determinants of revenue generation and has been put into three categories as follows;

Statistical determinants; degree of industrialization and industrial composition, the composition of public expenditures, extent of urbanization, level of per capita income or economic development, literacy level, size of the municipal/county, ratio of agriculture or mining to GDP, population growth rate, the development in money and banking system, foreign grants and loans, level of financial monetization and share of exports/imports to GDP or openness of the economy(see Tabellini 1985, Musgrave 1969, Lotz and Morss 1969, 1970, Lenka et al, 2012 and Muhammad and Ahmed 2010 etc.).

Social or institutional determinants; include the size of distribution of income, form of government, degree of corruption by tax collectors, honesty of taxpayers, resources allocated to tax collection, quality of tax administration, penalties for non-compliance to tax payment, importance of subsistence sector and parallel economy, climate and geographical conditions, occupational - structure, wealth, dependency on national government, development of social security system, political stability, attitude of citizens(Chaundry and Munir (2010), Shin(1969), (Olson 1987).
Tax policy determinants include; uses of tax sources, number of taxes, tax rates, and tax incentives (Feenberg & Rosen 1987, Stotsky and Woldemariam 1997,Aguirre and Shome 1987).

1.1.1 Local Revenue Generation in Nairobi City County
Nairobi city has played a very critical role in exercising its primary status as the seat of government of Kenya. Nairobi City was founded in 1899 as the Nairobi Urban District Council. Immediately after Kenya achieved independence in 1963, it was changed to City Council of Nairobi, created by Act of Parliament, Cap 265 of Kenya's Laws and put under the Ministry of Local Governments. In the year 2013, Kenya went through a devolution process and the Nairobi City County was established among other 46 counties. Kenya's Constitutional Referendum of 2010 gave birth to 47

autonomous counties in the country. Following the devolution, political and economic powers were transferred to the county from the national government. It is believed that a county government knows best what the needs of the taxpayers are and can avail and deliver public services effectively (Omar et al,1999, Phillip,2010 and World Bank,2012).

The Constitution of Kenya 2010,under Article 202(1) and 216(1), provides that the national government should share15 percent of the national revenue collected nationally with the county governments in form of an equitable share, using CRA formula[1].This share is calculated based on the latest audited national accounts. The rest of the budget for the county government comes from the local revenue sources, loans, donor funding and conditional allocations (the Republic of Kenya,2019).

The county government seeks loans for capital projects and must repay the loan with interest. There are cases when the national government guarantees such loan. Donor funds and grants are funds received from international development organizations to support a specific course, objective or goal in the county.

National government of Kenya conditionally allocate revenue to the county governments in form of conditional distribution to public hospitals, free maternal health care, compensation to county health facilities for forgone user fees revenue, medical tools lease, road maintenance fuel tax fund, allocation for county roads' repair and maintenance, and allocations towards respective county emergency funds. Additional allocations are funded for each county government through loans or grants from development partners (the Republic of Kenya,2015).

The constitution empowers Kenya's 47 county governments to generate their own income from property tax rates, service charge, entertainment taxes and other taxes permitted by Parliament's Act. The Act of Parliament also highlights the process of waiving taxes, fees, levies and other charges.

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[1] $CA_i = 0.45P_i + 0.25E_i + 0.18\hat{\rho}\tilde{u}_i + 0.08\acute{L}_i + 0.02\dot{P}_{ei} + 0.01\d{D}\dot{F}_i + 0.01\ddot{F}\dot{r}_i$ where

CA_i= revenue allocation of the ith County; P = Population Factor; E= Equal Share Factor; $\hat{\rho}\tilde{i}$ = Poverty Index; $\acute{L}$=Land Area Factor; $F\dot{r}$= Fiscal Responsibility Factor; $\dot{P}_e$= Personnel Emolument Factor; and $\d{D}\dot{F}$= Development Factor.

The Public Financial Management Act 2012(PFMA), adopted as of July 2012, is another critical and essential legal document that fosters public policy oversight and accountability in finance management. It accentuates the manner in which resources will be distributed between the two levels of governments, national and counties, and creates new institutions to foresee public finances. Such institutions are the Commission for Revenue Allocation, the Office of Controller of Budgets, Office of Auditor.

PFM Act set out the following requirements for the county government revenue management;

i)   A revenue division and revenue bills allocation in the county,

ii)   That total revenue should be more than the county government's recurrent expenditure.

iii) At least 30% of the expenditure for medium-term growth allocation.

iv)   Employee compensation and salaries should be less than a certain proportion of total income as prescribed for financing by the County Executive member.

v)   That the debt level should be less than a percentage of its annual revenue.

vi)   Submit, publish and publicize Integrated Development Plan as well as budget estimates by 30th of April.

vii) County Fiscal Strategy Paper be sent to county assembly and released within 7 days.

viii)   County Emergency Fund to be established to provide for disasters.

The County Government Act (2012) provides guidelines to the county governments on the delivery of county public services, mandates, decentralized units, citizen participation among others. The county governments in Kenya have not achieved financial autonomy and continue to receive support from the national government so as to deliver on their mandates. (the Republic of Kenya,2016).

Kenya's constitution2010, Article 216(2) requires the Commission of Revenue Allocation to make suggestions on the county government's funding and financial management to enhance their effectiveness. Office of Controller of Budgets oversees the utilization of public revenues and gives an account to the Parliament on how funds were used. It oversees the implementation of budgets by the national and sub-national governments. Auditor General's office is an independent body

and therefore not a subordinate to any individual or authority's dominance or control. It audits and reports on financial transactions of the national government, the county governments, courts, national assembly, commissions, public debts among others (Kenya National Treasury, 2017 and CoG and KLRC,2018).

Figure 1.1: Nairobi City County Local Revenue and Total Budget Balance
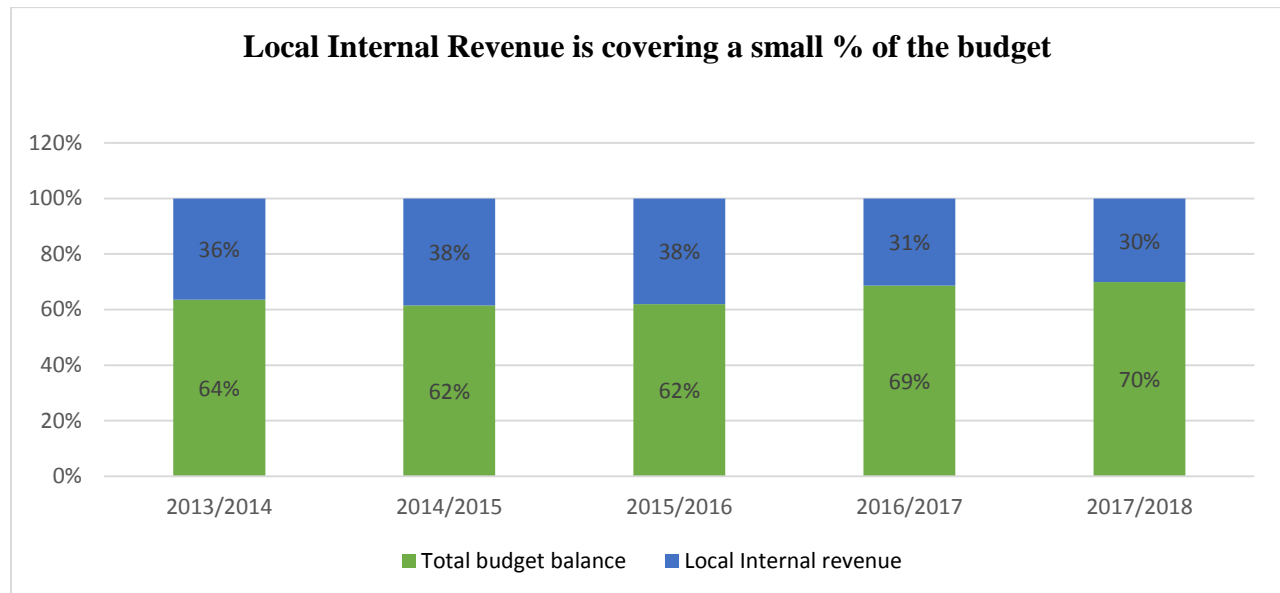
Source: Nairobi County Governments budget.

1.1.2 Profile and Trends of Local Revenue in Nairobi City County

The profile of local revenue sources in the county are ; fire inspection fees, land rates, regulation of buildings, decentralization, single business permits, market cess, building permits, rent, advertisement fees, fines and penalties, parking fees, liquor licenses, building % of construction cost), parking fees, billboards and advertisements, lease fees, food handlers certification permit, weights and measures, vendor fees, waste collection, rates and other revenues. (Nairobi City County,2017).

Fines and penalties are revenues received by the county from persons who contravene any of the provisions of Acts or any laws laid down by the government and thus commit an offense and is subjected to fines. Land rates are charges based on site value from valuation roll for commercial,

agricultural and residential plots. Regulation of buildings fees are charged to a person who erects a building or changes the use of a building or who owns or occupies a building.

Single business permits revenue comes from permits issued to operate a business or conduct any business within the jurisdiction of the county. Cess is a levy on tradable agricultural produce imposed by laws. Building permits are revenues associated with approving building plans. Parking fees are the costs of parking vehicles in an urban area. They include off-set street parking, automated parking area, loss of tickets charges, market parking and parking on the designated terminus.

Liquor licenses are a fee imposed by the county government to a party for a permit to sell and distribute alcoholic drinks within its jurisdiction. The license fee includes retail alcoholic drink license, brewer's license and import of alcoholic drink. The parties to acquire such a license are; bottler's, distributor, hotels selling such drinks, restaurant clubs, supermarkets, theatres, etc.

Billboards and advertisements are the revenues received from charges on advertisements made within the county. Lease fees and rent is mostly monthly fees or rents for the occupation of public properties found in the market and distributed across urban setting. These properties range from stalls, butcheries, hotels, workshops, modern kiosks owned by the county. Other charges in this category include the penalty for late payment. Food handler's certification fees are revenues from inspection of facilities and issue of food hygiene license for businesses handling food and animal products. Other revenue includes weight and measures fees, decentralization, waste collection fees. The trend of the local revenue collected in Nairobi City County since the beginning of devolution is as on Table 1.1;

Table 1.1: Actual Revenue Collected in Nairobi City County (2013-2018)(Kes Million).

	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018
Revenue Stream					
Fire inspection certificates fees	216	148	163	433	437
Land Rates	2582	2593	3160	2253	1871
Regulations of buildings	101	130	135	161	32
Decentralization-wards	214	243	221	188	70
Other revenue streams	701	1370	1138	991	1188
Rents-other estates	318	296	292	284	292
Rents-Eastlands	270	291	290	291	279
Single business permits	1542	1814	1786	1776	1786
Wakulima market	112	115	113	180	133
Building permits (1.25 % of construction cost)	760	1349	1171	843	239
Parking fees	1551	2016	2038	1974	1878
Billboards & advertisements	693	676	663	720	826
Other markets	139	105	99	76	140
Liquor licenses	0	210	208	233	95
Lease fees-NWSC-construction site board	71	137	167	325	664
Food handlers certificate fees	57	89	64	201	192
Total Local Revenue	**9,327**	**11,582**	**11,708**	**10,929**	**10,122**

Source: County Budget Review and Outlook Paper 2017/2018.

The current local revenues mobilized in Nairobi City County are not enough on its own to support the quickly growing urban population and to supply necessary public commodities and services. According to the Kenya National Treasury (2017), *Draft National Policy to Support Enhancement of County Governments' Own-Source Revenue* report, the following are the challenges facing revenue generation; low automation and poor funds administration, absence of revenue policies

and legislation to underpin revenue-raising measures, illegal issuance of waivers and variations, multiplicity of county fees and charges, weak understanding of county revenue administration costs, challenges related to financing of urban areas and cities, human resources capacity and enforcement issues, inappropriate institutional arrangements, cash handling, and invalidation of sharing of revenue from court fines.

1.2 Statement of the Problem

Article 175 of Kenya Constitution 2010, under devolution, states that county governments should have unwavering income sources to deliver value, efficiently regulate themselves and promote decentralization of national tasks and services. Nairobi City County is still largely financed from the Exchequer, as shown on figure 1.1, but the scope of growth for this source of funding is limited due to other national priorities as well as international commitments that the country undertakes. Nairobi City County have made efforts to generate additional financial resources from their own base but this still represents a small percentage of the county's total budget, as shown on figure 1.1. Also, the local revenues have been declining over the years and revenue targets have not been met despite the optimistic forecasting as shown on figure 1.2.

The Kenya National Treasury noted the decline in revenue generated in the county and in other counties and conducted a county revenue potential study. The findings were that that counties, including Nairobi city county, could dramatically increase revenues beyond the current levels and that the potential is still quite large yet the county is leaving so much on the table (National Treasury and Planning,2018). Nairobi City County confirmed this on the county budget and economic forum report (2016) and County Fiscal Strategy Paper (2018) that local revenue has been deteriorating, uncertain, unstable and unpredictable and this has affected service delivery, county projects and programmes.

Other authors, like Phillip (2010) tried to find a solution to this problem by examining the factors determining income collection in Nairobi city council by examining variables such as control system, public awareness, staff motivation and corporate governance. Okiro (2015) researched the impact of e-payment scheme on Nairobi government's income collection and shows that the use of e-payment scheme favors the collection and management of taxes. Muli(2014) researched the difficulties of implementing Devolution Plan in the county and concluded that possible

solution to the challenges is for the county to increase local revenue generation by seeking new and alternative sources.

Abwori (2015) researched into the effect of performance contracts on tax raising at Nairobi City County and found a sharp rise in revenue generation after the rolling out of performance contracting as compared to five years before implementation of the same. Njogu(2016) found out that one of the setbacks to strategic plans implementation in Nairobi City County includes lack of enough revenue and finances to implement such plans. On the national level, Jepkemboi (2008) analyzed the macroeconomic factors of Kenya's tax income share, looking at the rate of per capita income, trade, farming and other variables.

Figure 1.2: Nairobi County Target and Actual Revenue Collection since Devolution.
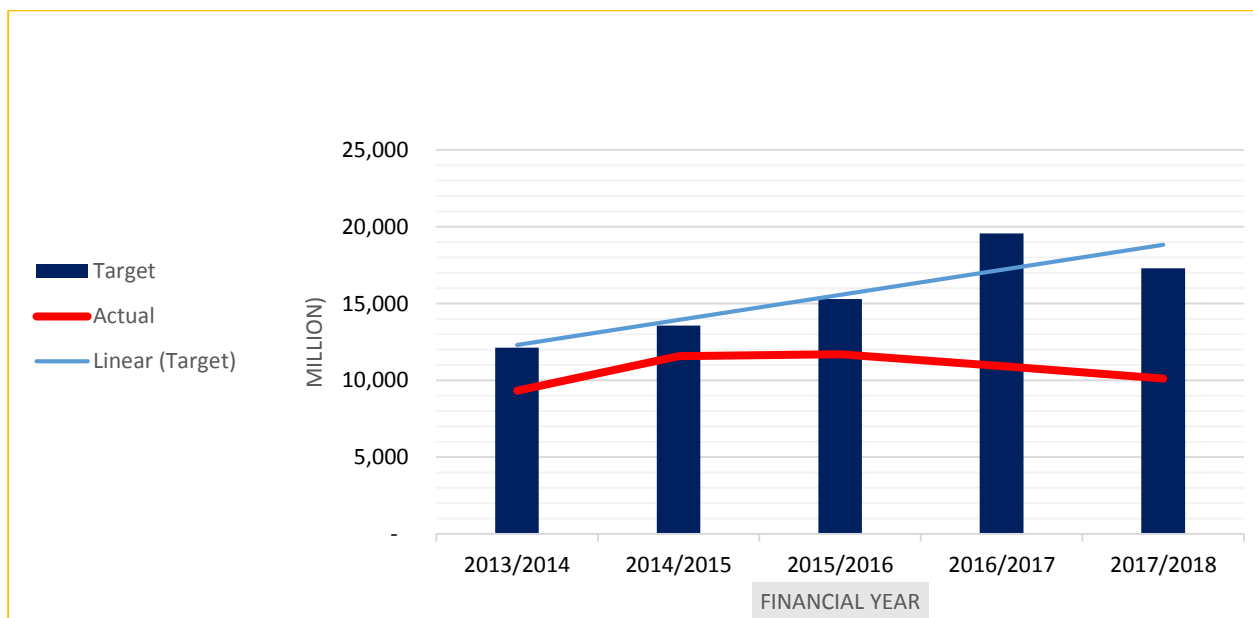
Source: Office of the Controller of Budgets.

With above mentioned, it is critical to find the solution to this problem and hence this study intends to empirically establish the variables that determines the local revenue generation in Nairobi City County and ways to address such issues through policies.

1.3 Objectives of the Study

Major aim is to investigate the determinants of local revenue generation in Nairobi City County during the period 2013-2018. Specific objectives are;

i) To examine the profile, trends and performance of local revenue generated in Nairobi City County

ii) To examine the correlates of local revenue generation in Nairobi City County

iii) Examine the short run and long-run relationships of the determinants of local revenue in Nairobi City County.

iv) To draw policies that can improve local revenue generation in Nairobi City County.

1.4 Justification for the Study

The research contributes to existing empirical literature on local revenue generation and performance in local governments on issues that were previously not popularly used therefore closing the knowledge gap and provides methodological techniques to enhance the study in this area.

The results will give a better comprehension of local government/municipality revenue in Kenya and internationally by providing evidence on the determinants of revenue of local governments and the indirect use of government policy to control local government revenues. It will help policymakers in the county know how the economic sector in the county will impact revenue generation and regularly reevaluate their strategies to manage revenue fluctuations and anticipate future fiscal challenges. Academics and researchers can also use the findings to further their research by providing more knowledge to research scholar and institutions for further research.

1.5 Organization of the Study

Chapter 2 deals with literature review which looks at the theoretical review, empirical literature and literature overview. Next, chapter 3 describes the econometric methodology including the empirical model for the determinants of local revenues, description of variables, operationalization of variables, diagnostic tests, estimation procedure, and sources of data.

Chapter 4 provides empirical findings and Chapter 5 is the summary of the project, conclusion, implications of policies and topics for further study.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

The chapter entails diverse arguments and theories explaining determinants of local revenue that have been proposed by past authors and researchers in public finance.

2.1 Theoretical Literature

The analysis of determinants of local revenue generation in Nairobi City county is anchored on four theories; the ability to pay principal of Slade (1939), the benefit principle of Lindahl(1919), theory of fiscal policy and Theory X and Theory Y.

2.1.1 Ability to Pay Theory

In concordance with Slade (1939), the only reasonable way to finance public goods and services provision must rely on one's capacity to pay implying those with high income should pay most taxes while those with low income should pay the least. This form of progressive taxation system is based on the equal sacrifice concept which means that the burden of taxation is distributed based on the total loss of utility resulting from the taxation. Tax payment is seen as a denial and sacrifice to the taxpayer and for this reason, it is based on three interpretation of sacrifice; the equal[2], equal-proportional[3], and least-sacrifice theories[4].

A difficulty arises when there is no unanimous agreement to the explicit measure on ability to pay. Consequently, the following three perspectives have been advanced by economists and have been captured in the previous theoretical works (see Mativo et al, 2015; Abubakar et al,2018; & Otu et al,2013, etc).

Firstly, to measure the ability to pay, ownership of property can be used where a person earning more income can purchase more property and thus is subjected to taxation than a person earning

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[2] Taxes should be set so as the sacrifices made by all taxpayers are equal.
[3] The sacrifice is equally proportional to taxpayers' income so that the tax paid by the rich represents a greater sacrifice than tax paid by a man of moderate means.
[4] Taxes are laid first on the incomes of the very rich to reduce to the level of the rich. Then the rich are taxed to reduce their income to the level of persons of moderate means who will then be taxed only after the incomes of the very rich and the rich have been reduced by taxation to their level.

less income ceteris paribus. But this idea does not hold where a person earning more income does not buy property and so is not subjected to pay any tax.

Secondly, a person's expenditure can be used. High spending translates to high taxes to be paid. This, however, can be unfair where an individual has a large family and needs to pay more, and by doing so, he pays more taxes than a person with a small household and has to spend less and pay fewer taxes.

The use of income can measure ability to pay. Higher earners should pay more tax than low earners. This promotes equality and fairness in providing funds required by the government. Income is the best test to measure a taxpayer's ability and have there been adopted in many countries. According to Chelliah (1971), because of the greater tax base, elevated per capita revenue represents greater growth.

2.1.2 Benefit Theory of Taxation

Benefit principle was originally designed by Wicksell (1896) and Lindahl (1919). The approach extended to works of Samuelson (1954), Musgrave (1959) Musgrave and Peggy (1973), Johansen (1963), and Foley (1970). The benefit principle[5] states that the taxpayers should pay taxes in proportion for the goods/services/ benefits that they obtain from government. Those who benefit the least pay the least and the most to benefit pay the most amount of tax to the government.

Lindahl model determines the extent of state activity and the allocation of tax burden. Public goods and services are provided so as to ensure everyone gains and that each individual consumes his/her most preferred optimum distribution of public goods and services appertaining to their tax share. The ability to repay for public good, therefore, rises with wages.

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[5] Criticisms of this theory is that, practically, the poor will be pushed to pay heavy taxes than the rich hence violates the principle of justice. Also, the state does not maintain a link or relationship between benefits conferred and benefit derived and to estimate, every year, what benefits the taxpayer has enjoyed is not possible.

2.1.3 Theory of Fiscal Policy

The British economist John Maynard Keynes developed this theory and is also known as the Keynesian economics. It argues that government receives taxes from the taxpayers and uses these revenues to provide public goods and services and also fund development projects and public investments. According to Khattry and Rao (2002), the government is faced with decisions of optimum limited resource allocation and subsequently tradeoff between competing sectors. This theory posits that policymakers can control levels of macroeconomic productivity by raising or lowering tax and public expenditure levels.

2.1.4 Theory X and Theory Y

McGregor (1960) introduced this concept and proposed two unique human views; one negative, termed Theory X or authoritarian, one positive or Theory Y. Authoritarian suggests that people are heavily influenced by lower-order needs. Theory Y is participative and it implies that higher-order needs influence individuals.

Under Theory x, employees lack motivation and generally don't like work are forced, micromanaged and threatened to align with organization's objectives. Workers put safety above all other work-related factors and show little ambition. Under Theory Y, employees are driven to see work as natural as rest or play. They practice taking initiative, self-management, and self-control and learnt to accept and seek responsibilities and make innovative decisions.

2.2 Empirical Literature

Quite a few researches on determinants of tax revenue have been done at international, regional and national level. This section will analyze the empirical studies on the correlates of local revenue generation and particularly focusing on county/local government debt, capacity, inflation, information technology, infrastructure and exchange rates.

2.2.1 Debt

According to Clist and Morrissey (2011) results, working with a panel data of 82 sample third-world countries, showed that external loans and external debts are positively correlated with tax revenues. Increase in debt and loans increases tax revenues. They further pointed out that this

change is not proportional and that it is non-linear. There would be a point where the amount of external loans will start to reduce taxes.

Crivelli and Gupta (2014), also using panel data, and performing correlation analysis found out that public debt has a strong positive impact on tax revenue. The results of the correlation between public debt and income from tax were desirable that if public debt increased, tax revenue would also increase as there is a need to generate revenues to repay the debt.

Teera and Hudson (2004), conducting a comparative study on tax performance, revealing negative association between public debt and tax ratio for different nations. The analysis uses panel data from 116 nations and tax performance results were compared with the average tax performance.

Tanzi (1987, 1992) argues that a huge public debt will make the government want to boost revenue generation to repay the debt. Government will explore the most preferred sources of income by weighing costs and benefits, for instance, by increasing the imports duties, which is better than an inflation tax. High debt burden increases tax level. The impact of a government debt relies on how it is funded and how large it is.

Chaundry and Munir (2010) corroborated previous analysis and employed time series to study the factors affecting low tax income in Pakistan for the duration between 1973-2009 and found out, using regression analysis, that debt is both statistically significant and positively associated to tax revenue.

Eltony(2002) probed determinants of revenue from tax shares in sixteen Arab nations by developing an index of tax effort. The author found out that debt was statistically significant with a positive sign that the debt raised tax revenue.

2.2.2 Human Resource Capacity
According to Chaundry and Munir (2010), worker's remittances or employee wages are positively associated with tax revenue collection. The authors, while using time series data, explained that paying capacity of the recipients of such wages increases as well as their income and wealth all

these are considerable brackets for direct taxes. The analysis found a positive sign but statistically insignificant revealing that rise in human resource capacity does not directly contribute to the generation of tax revenue in Pakistan.

2.2.3 Inflation

Greytak and Jump (1977) assessed the connection between inflation and local government spending and revenue using Laspeyres index number formula where they established that when inflation increases, it does not automatically increase taxes and revenue growth. They also observed that revenue growth is influenced by inflation period.

Adam et al (2000) gathered panel data for 22 nations in Africa and used fixed effects model to estimate exchange rates and revenue performance between 1980-1996. Findings showed that rise in inflation decreases level of tax revenues. With low inflation, there was a revenue gain but these yields were increasingly cancelled out by increasing real exchange rate misalignment.

David and John (1979) disagree with the traditional belief that inflation negatively affects the state and local government revenues and that they are actually gaining from inflation. Bahl and Martinez-Vasquez(1989) concluded that inflation may increase the relative price of public goods, leading to an increase in government revenues. Inflation is a concern to economic policymakers because of its capacity to impoverish individuals on a large scale and eventually, to corrupt social institutions.

Pessino and Fenochietto (2010) results showed a negative connection of tax capacity and inflation. Tanzi, (1989) found that high inflation reduces the tax base. This is because the economic agents would want to protect their wealth and would make a portfolio adjustment so as to favor the assets that will not be taxed heavily. Nashashibi and Bazzoni (1994) claimed that when inflationary policies are sought out by the government, tax revenue can be affected negatively. Such policies include devaluation, expansionary fiscal policies and monetization of the budget deficit.

However, in the case of Pakistan, Chaundry and Munir (2010) noticed positive correlation of inflation and taxes. This positive sign is unexpected, as theory and other empirical literature like the ones shown above suggests a negative sign.

Saibu and Sinbo (2013) learnt that exchange rate and inflation cause a significant response in tax revenues, that inflation and exchange rate depreciation adversely affects tax revenues. This is a study on the macroeconomic factors of taxes in Nigeria for period 1970-2011 and it uses ECM and Johnson co-integration approach for checking parameters' long-run and short-run associations. Other finding from research is that debt adversely affects tax revenue level.

2.2.4 Exchange rates

Depreciation/devaluation of exchange rate beneficially affects the general economic activity thereby increasing tax revenue. Overvalued exchange rate has anadverse effect on economic activity, therefore lowering the tax revenue.

Tanzi(1989) observed opposite association of exchange rates and tax revenues. Appreciation[6] of real exchange rates leads to a decline in tax revenues. Omolo (2012) results confirm that exchange rate is positively correlated with tax revenue collected. Whenever there is an increase in the dollar, the shilling loses its value resulting in depreciation[7] of a shilling. The country whose currency is losing its value against a dollar stands a chance of losing tax revenue collected.

Oloo(2002) using time series data reveals that exchange rate negatively affects the tax revenue. It's taken to have been caused by change in demand from imports towards domestic production, which escape taxation or are taxed at a lower rate.

Grindle and Thomas (1991) conducted a study on the best practices in trade reforms in African countries including Kenya. The study found that exchange rate depreciation would broaden output, a tax base, and hence will lead to tax revenue growth.

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[6] Appreciation is the value rise or exchange rate strengthening causing fall in exports and increase in imports.
[7] Depreciation is the decrease in value or weakening of exchange rate and exports become competitive and imports more expensive. It is brought about by contractionary financial policies.

Islam and Deborah (1991), Haque and Moutiel (1991), Nashashibi and Bazzoni (1994), Moraude and Habbel (1991) have similar results where they found a favorable impact of exchange rate depreciation and inflation on taxes. Price effect-how change in price affects demand- may negatively affect the volume of imports but increases the volume of domestic production of import substitutes and on tax revenue. Exchange rate appreciation lowers value of imports relative to GDP deflator, and vice versa. It will also tend to increase the unit values of import substitute and exports relative to non-traded goods.

As documented by Ghura, (1998) using panel data of 39 African countries and applying regression analysis, finding shows that real effective exchange rate appreciation positively influence taxes but statistically insignificant and explanation for this is that most revenue receipts are dependent on imports and not export taxes. On the contrary, overvaluation of real effective exchange rate resulting from expansionary financial policies would adversely affect economic activities and would therefore, lower tax revenues. The author also noted that tax revenue rises as inflation declines and concluded that economic policies that promoted a noninflationary environment can increase tax revenues.

2.2.5 Infrastructure

According to Bassanini, Scarpetta and Hemmings (2001), public investment in physical capital could raise long-term tax revenues and lead to economic growth if technological progress is stimulated by this investment or if productivity is enhanced. Angelina (2013) concluded that the erosion of local revenues comes from the decay of municipal infrastructure and the provision of municipal services.

Mwakalobo (2009) indicated that when local revenue decline and revenue collection is not enough, public investment expenditure on infrastructure will decrease, and local government will be unable to improve infrastructure without sufficient revenue.

2.2.6 Information Technology

Odoyo et al(2013) research findings deduced that investment in information technology is quite valuable to municipal government since computerized information systems positively affects tax generation. Computerization of local government activities like revenue collection, which results to timely revenue collection, improves efficiency, boosts management integrity and produces straightforward records. Information systems, from the strict controls, improve operations which then also improves local government's efficiency and productivity.

Githinji et al(2014) while studying effects of ICT on county tax generation in Kenya established that control system, management information system and ICT infrastructure significantly increase revenue collection in county governments and this will also boost service delivery.

Karimi and Maina(2017) concluded that information technology is critical to local governments since it has a positive effect on tax generation. It ensures prompt receipt of revenue, improves accountability of management and the availability of transparent records. Information systems have since strengthened processes supported by control systems and increased the operational efficiency of the county.

2.3 Overview of Literature

From the studies reviewed, a number of variables have been identified that influence the revenue and tax generation with most of the studies focusing at national level in developed countries with a few literatures on sub-national level in developing countries.

Most studies show that debt is positively associated to tax revenue. Empirical literature directly related to the subject on the determinants of local revenue generation and human resource capacity is particularly limited with the few available concluding that it's positively correlated to taxes. Contrarily, inflation has detrimental influence on taxes while exchange rate has both positive and negative effect; appreciation of exchange rates unfavorably affect tax revenue and depreciation of exchange rates positively affect tax revenue. Information technology and infrastructure development both positively affects the taxes.

Many of these researches on the determinants of tax income generation used panel data methodology. This present study examines determinants of local revenue in Kenya's local government, the Nairobi City County, and it uses the most recent data and adding new variables and examining their short and long term outcomes. Tax revenue generation issue is very critical to many national and sub-national governments and researchers have recommended policies and methods to increase tax revenue.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

The following section focuses on analytical approach, empirical model, diagnostic tests, estimation procedures and data types and sources.

3.1 Theoretical Framework

Lindahl (1919) expressed his ideas using pictures and texts and not mathematical definition of equilibrium concepts. In this case, individuals make decisions on quantity and supply of public commodities and services considering cost share of production of public good.

Slade(1939) explained the ability to pay theory using the concept of marginal utility of money to elaborate on the sacrifice theory. The utility of money itself must be held to decline with an increase in supply. As incomes grow, goods and services bought for consumption become relatively less important in the total.

The collection from the taxpayer finances public services delivery and it shows the existence of sacrifice in progressive taxation for which the taxpayer would be unwilling to do without. The ease of obtaining money is as much an individual matter as the sacrifice of parting with it. My ease and your ease cannot, therefore, be reduced to comparable units more than our respective sacrifices can. Sacrifice cannot, therefore, be reduced to a quantitative expression. The sacrifice theory has been shown to rest on (1) the declining money utility accompanying rise of its supply, (2) sacrifice in tax payment and (3) precise representation of that sacrifice. All these supports are required if the theory is to be sustained and none should be missing. All have been found defective. With the support of its underlying theoretical structure removed, the ability-to-pay theory of taxation breaks down (Slade, 1939)

The collapse of ability to pay theory led to other authors developing it further. For instance, this idea was picked up by Heller (1975), Leuthold (1991) who developed it further to understand fiscal behavior of public sector which assumes that it reflects actions of public decision-makers. Decision-makers maximize their usefulness in view of alternative uses of government funds, distribution of total output to public and private sector, alternative sources of domestic financing

(borrowing, taxation) and alternative sources of external assistance. The model used to explain state and local government fiscal behavior, and therefore the decision-makers ' utility function is given as;

$U = F (P,(Y-T), C_1, C_2, D; F_g, F_l)$ (1)

Where;

P = public expenditure,

Y-T= GDP less taxes which is also disposable income in private sector,

C_1 = Public sector "civil" consumption

C_2, = "Socio-economic" public sector consumption,

D = domestic borrowing and debt,

F_g = foreign grants and

F_l = total foreign loans.

P, C_1, C_2 are expenditure categories.

The consumer and decision-maker is normally limited by budget when trying to maximize his/her welfare, implying total revenue must be equal to total public expenditure as shown by equation 2;

$T + F_g + F_{l +} D = P + C_1 + C_2$ (2)

Maximizing welfare function subject to budget constraint gives the desired tax income as shown on equation 3;

$U = b \ln (Y-T-Ws) + (1-a) \ln(G -Ps)$ (3)

Where

b = 0 <k<1 (constant between 0 and 1),

G=government consumption plus investment,

Ws= Livelihood earnings

Ps = basic public goods

$LR = (1-b) - b((F_g + F_{l +} D) + bPs - (l-b) Ws)$ (4)

This implies that local revenue is favorably associated to (1-b) and the welfare weight of subsistence public goods and services. Local revenue and overseas grants and national debt have

an inverse relationship. Local revenue and subsistence income level relationship is debatable depending on the sign of (bPs - (l-b) Ws) which is contingent on subsistence levels of public goods and services and welfare weight.

3.2 Empirical Model

The empirical model's functional form for this research is provided as;

$$LR_t = f(HRC_t, DB_t, TN_t, IFR_t, ER_t, INF_t). \tag{5}$$

Where LR, is local revenue and is a function of human resource capacity(HRC), debt(DB), exchange rates(ER), Information technology(TN), Infrastructure(IFR) and inflation(INF).

Explanatory variables have a combined result on the dependent variable and are expressed below in a non-linear form;

$$LR_t = \alpha_0 \, HRC_t^{\alpha 1} \, DB_t^{\alpha 2} \, ER_t^{\alpha 3} INF_t^{\alpha 4} TN_t^{\alpha 5} \, IFR_t^{\alpha 6} \tag{6}$$

Adding the error term and the intercept, the linear model is given below;

$$LR_t = \alpha_0 + \alpha_1 \, HRC_t + \alpha_2 \, DB_t + \alpha_3 \, ER_t + \alpha_4 \, INF_t + \alpha_5 \, TN_t + \alpha_6 IFR + e_t \tag{7}$$

Assumption: $e_t \sim$ I.I.D $(0, \sigma 2)$

The subscript t stipulates the time period. $\alpha_{1......} \, \alpha_4$ are estimable parameters.

To make the data conform to normality and because of large variation in the data, we express the variables in natural logarithm form to give;

$$lnLR_t = \alpha_0 + \alpha_1 \, lnHRC_t + \alpha_2 \, lnDB_t + \alpha_3 \, lnER_t + \alpha_4 \, lnINF_t + \alpha_5 lnTN + \alpha_6 \, lnIFR e_t \tag{8}$$

Where lnLR is the natural logarithm of local revenue at time t; $lnHRC_t$ is natural logarithm of human resource capacity at time t; $lnDB_t$ is natural logarithm of Debt, $lnER_t$ is natural logarithm of exchange rates at time t; $lnINF_t$ is the natural logarithm of inflation at time t; lnTN is the natural logarithm of information technology at time t, lnIFR is the natural logarithm of Infrastructure at time t . $\alpha_{1......} \, \alpha_6$ are estimable parameters, e_t is residual.

3.2.1. Description of Variables

The following are the definitions of variables and their measurements.

Local Revenue: The revenues collected by the local government from the sources within its jurisdiction (property taxes, entertainment fees, fines, and penalties, etc). This is measured every month in absolute monetary terms and in Kenya shillings.

Inflation: change rate of consumer price index (CPI) is measured on a monthly frequency.

Exchange rate: is how much Kenya shillings is worth compared to US dollar and is measured monthly.

Human resource capacity: This is the employee compensation expenditure: Employee compensation, wages, allowances, statutory contribution for workers working at the county government. This is measured monthly in absolute monetary terms and in Kenya shillings.

Debt: It is total outstanding borrowing by the Nairobi county government, and it includes the principal and interest of any county debts, including statutory creditors, suppliers/contractors, legal creditors, utilities, loans, contingent liabilities, employee benefits for retirees and deceased. This is measured monthly in absolute monetary terms and in Kenya shillings.

Infrastructure: This represent the expenditure on structure and facilities like acquisition, construction and refurbishment of buildings, construction of roads, civil works, purchase of vehicles and other equipment, specialized plants and machinery.

Information Technology: these are the equipment, tools and processes used to collect revenue and it includes expenditure to purchase of ICT equipment, software and other ICT assets

3.2.2 Operationalization of Variables

This section will highlight how the variables are measured and it translates the theoretical to operational by defining or getting the meaning of variables in this study.

Operation, according to Sekaran (1992), is the precise variable description variable to make measurement and calculation easy. Local revenue, human resource capacity, debt, exchange rates, information technology, infrastructure and inflation are the variables in this study.

Table 1.2: Operationalization of Variables

Variable	Unit of measurement	Expected sign
Dependent Variable		
Log of Local Revenue (LNLR)	Log of monthly revenue collected, in Kenya Shillings, from sources by the Nairobi City county.	
Independent Variables		
Log of Human Resource Capacity (LNHRC)	Monthly logged wage expenditure incurred by the Nairobi city county in Kenya Shillings.	Positive
Log of Debt (LNDB)	Log of total loans advance to Nairobi City County in Kenya Shillings.	Positive, Negative
Log of Exchange rate(LNER)	Log of Kenya Shillings per unit of US Dollars	Positive, Negative
Log of Inflation (LNINF)	Log of monthly variables of the consumer price index-rate	Positive, Negative
Log of Information Technology(LNTN)	Log of monthly information technology expenditure incurred by the county in Kenya Shillings	Positive
Log of Infrastructure(LNIFR)	Log of monthly variables of infrastructure expenditure incurred by the county in Kenya Shillings	Positive

Source: Author (2019).

3.2.3 Conceptual Framework

The dependent variable is local revenue whereas the explanatory variables are human resource capacity, information technology, infrastructure, debt, exchange rates, and inflation in Nairobi City County.

Figure 1.3: Conceptual Framework
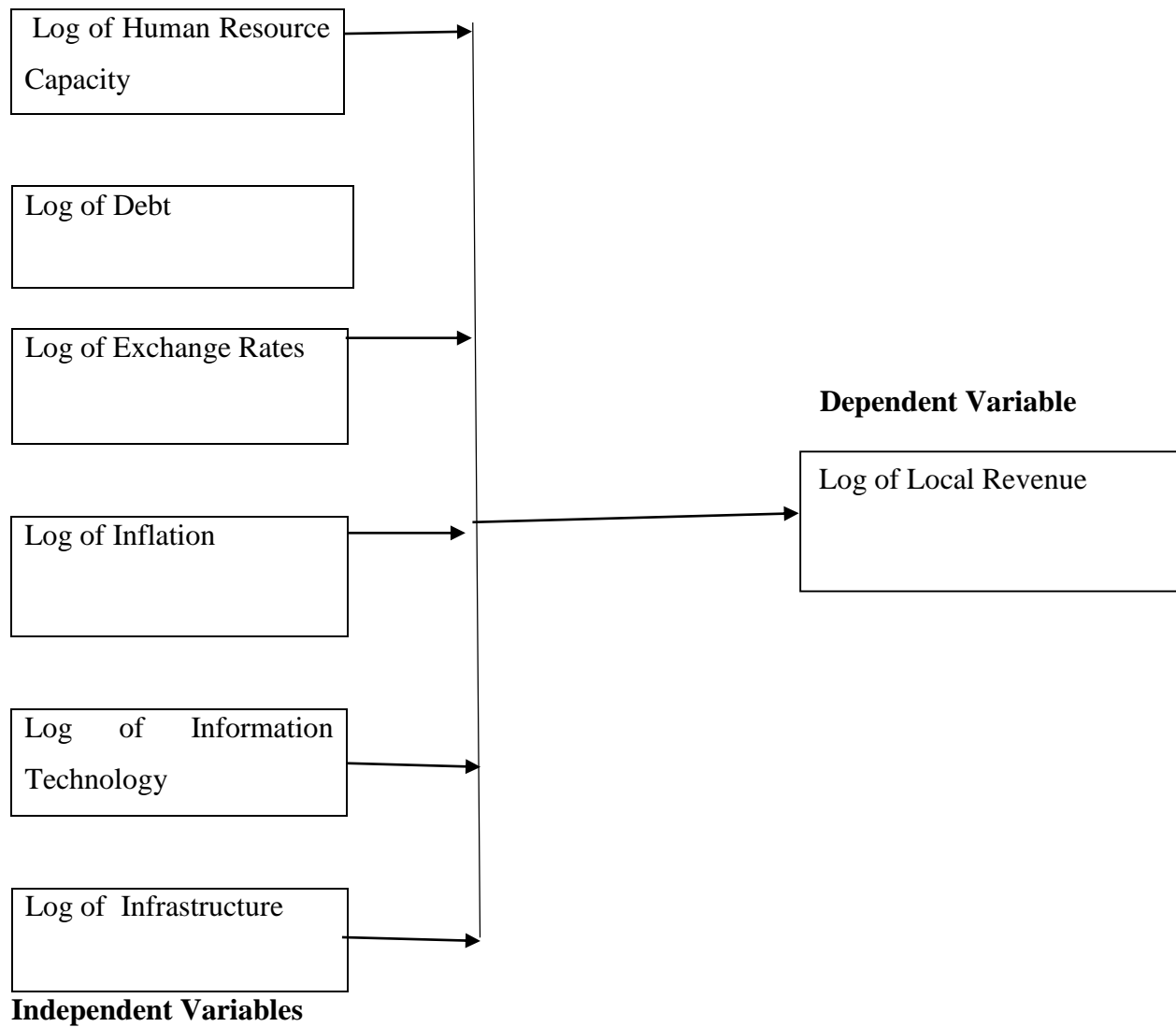
Source: Author (2019).

3.3 Diagnostic Tests

Diagnostic or specification tests give the model the proper functional and mathematical form. To draw viable inferences and ensure that variables are viable for forecasting, the model need to be checked to eliminate any inadequacy or failure. The tests in this study include normality, serial correlation, co-integration and stationarity to verify the effectiveness of the model to establish the determinants of local revenue.

3.3.1 Normality Test

This analysis is carried out to see whether data and variables used are well-drawn out of a normally distributed population. Test developed by Shapiro & Wilk (1965) was used since it is best for few observations. The Ho is that variable is normally distributed while H_1 is that variable is not normally distributed at the selected level of significance. This test can be graphical or statistical to check whether the mode, median and mean of the variable are equal. Non-normality occurs when variable and error terms are not normally distributed. Kurtosis of 3 is a normal distribution and is called mesokurtic, kurtosis <3 is platykurtic, kurtosis >3 is termed leptokurtic. Skewness between -0.5 and 0.5 implies that data are relatively symmetrical, between-1 and-0.5 and between 0.5 and 1 indicate that the data is slightly skewed, lower than-1 or more than 1 means that data is highly skewed.

3.3.2 Unit Root Test

It checks variable stationarity which implies that variance, mean and autocorrelation does not vary across period hence integrated of order zero and easy to predict (Gujarati, 2003). Non-stationarity is when these statistical properties vary over time and for any statistical analysis to be carried out, the series is de-trended or differenced once or a few times (integrated) for it to be stationary. This research checks for stationarity of variables to select appropriate de-trending procedure for the proceeding estimations. To do this, Augmented Dickey-Fuller test is applied.

3.3.2.1 Augmented Dickey-Fuller Test

Initially created as Dickey-Fuller test and subsequently updated to ADF test, it solves the shortcomings of the earlier version of being an auto regression process of order one and having an autocorrelation problem. ADF does this by allowing running of several variables lags so that residuals are distributed as white noise.

$$\Delta y_t = \alpha_0 + \delta t + \Upsilon \, y_{t-1} + \sum_{i=1}^{n} \beta i \Delta \, y_{t-1} + \varepsilon_t \qquad\qquad (9)$$

$\varepsilon_t \sim$ I.I.D $(0, \sigma 2)$, y = time series, Δ=first difference operator, γ = the stationarity coefficient, n= maximum number of lags specified determined by AIC or SBIC, δ = time trend coefficient, $\alpha_{0=}$ constant and βi = estimated parameters

A unit root test is calculated as a t-statistic on w such that

$$tw = \frac{w-0}{se(w)} \tag{10}$$

H_o is $w = 0$ and H_1 is that $w < 0$. When t-statistic $<$ ADF critical values, reject H_o and conclude that no unit root exists. When it's non-stationary (have unit roots), the data is converted to stationary by differencing and, ADF test is then performed.

3.4 Co-integration

According to Cross, Worden and Chen(2011), two variables are co-integrated if initially both are non-stationary but becomes stationary when differenced so that their linear combination is stationary and long run dependence exists among variables. Standard regression analysis of non-stationary variables will show false co-integration which then leads to spurious results and consequently wrong interpretation. This means if two parameters are co-integrated, the linear combination of their residuals becomes I(0), and spurious regression disappears.

Null hypothesis, Ho: $\alpha_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4$. Implying that there is no co-integration (there is only short-term and no long-run relationship.). When series in the model is stationary I(0), there is no need for co-integration, since any short-run shock easily transitions to the long-term and therefore long-term equilibrium or static model is calculated. Variables are neither differenced nor lagged. Alternative Hypothesis, H1: $\alpha_0 \neq \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4$ and it implies co-integration presence (long-run relationship). Where variables are unpredictable and non-stationary, co-integration test is required with an assumption that long-run relationship exists despite the series drifting apart.

To test for co-integration where all series are I (1), Engle-Granger test or Johansen- Juselius test are used and where series are of different co-integration, then Bounds co-integration test is used.

3.4.1 Bounds Testing Approach to Co-integration.

The H_o is no long-term association of variables i.e. co-integration does not exist and H_1 that variables have long-run association. F-statistic is estimated and equated to critical values of upper bounds. When F-statistic$>$ critical values of upper bounds, we conclude that co-integration is present. If the measured F-coefficient is less than critical values of the lower bound, we accept the null hypothesis of no long-run relationship. If the measured F coefficient is between the upper and lower ranges, the test will be inconclusive (Pesaran, Shin, and Smith (2001).

3.5 Model Estimation Technique

The estimation methods that this study will use to examine the correlates of local revenue generation in Nairobi City County are an autoregressive model or a dynamic model. To define short-run and long-run association of determinants of local revenue, Autoregressive Distributed Lag (ARDL) and Error Correction Model (ECM) are used and this is determined by the co-integration test. ARDL is used to test long-run association. ECM tests short-run relationships where the variables are co-integrated. Optimal lag length is established using AIC or SBIC and where there are too many lags, forecast error increases, and with few lags, there is loss of important information and subsequently model misspecification. After this, OLS is used to select the either ARDL or ECM based on model selection criterion.

ARDL model to find long-run empirical analysis's equation is;

$$Y_t = b_0 + \sum_{i=1}^{q} \varphi_i \, Y_{t-i.} + \sum_{i=0}^{p} z'_i X_{t-i} + \mu_t \tag{11}$$

Y_t = (mx1) vector; b_0 = constant; φ and Z = coefficients; p & q=optimal lag orders; μ_t = white noise vector; X_t variables in it are only co-integrated or I(0) or I(1).

And therefore using our variables;

$$\Delta \ln LR_t = \alpha_0 + \sum_{i=1}^{n} c_i \, \Delta(\ln LR)_{t-i} + \sum_{i=0}^{n} d_i \, \Delta(\ln HRC)_{t-i} + \sum_{i=0}^{n} h_i \, \Delta(\ln DB)_{t-i} + \sum_{i=0}^{n} k_i \, \Delta(\ln INF)_{t-i} + \sum_{i=0}^{n} l_i \, \Delta(\ln TN)_{t-i} + \sum_{i=0}^{n} m_i \, \Delta(\ln IFR)_{t-i} + \omega_1 (\ln LR)_{t-i} + \omega_2 (\ln HRC)_{t-i} + \omega_3 (\ln DB)_{t-i} + \omega_4 (\ln INF)_{t-i} + \omega_5 (\ln TN)_{t-I} + \omega_6 (\ln IFR)_{t-I} + \varepsilon_t \tag{12}$$

Where n= lag length; Δ= first difference operator; ε_t= random term; α_0 = drift component.

Estimation using the EC model is given as;

$$\Delta Y_t = b_0 + \sum_{i=1}^{q} f_{1i} \, \Delta Y_{t-i.} + \sum_{i=1}^{p} f_{2i} \Delta X_{t-i} + \delta ECT_{t-i} + v_t \tag{13}$$

In the model above, ECT = error correction term, shows the speed at which variables converge to a balance. It should be statistically significant with negative sign coefficient. It is given as ECT=(Y_{t-i}- $\emptyset X_t$) , and $\emptyset$=long run coefficient; f_{1i} and f_{2i} = model's short run relationship

coefficients.$\delta=(1-\sum_{i=1}^{p} g_i)$ is negative showing convergence in long-run and this is speed of adjustment parameter towards equilibrium. Applying our variables to this model gives;

$$\Delta\ln(LR)_t = b_0 + \sum_{i=1}^{n} f_{1i} \Delta(\ln LR)_{t-i} + \sum_{i=0}^{n} f_{2i} \Delta(\ln HRC)_{t-i} + \sum_{i=0}^{n} f_{3i} \Delta(\ln DB)_{t-i} + \sum_{i=0}^{n} f_{4i} \Delta(\ln INF)_{t-I} + \sum_{i=0}^{n} f_{5i} \Delta(\ln TN)_{t-I} + \sum_{i=0}^{n} f_{6i} \Delta(\ln IFR)_{t-I} + \delta ECT_{t-I} + v_t \qquad (14)$$

3.6 Post-Estimation Tests

These tests are performed to guarantee that the estimates are valid and reliable. Serial correlation exists where residuals in regression model are dependent on each other or a situation in which the residual terms in one period are correlated with that of subsequent period. We employ Breusch-Godfrey LM test in such case. Testing the model stability to check the suitability for making long run decisions, we use CUSUM test. Recursive residual test checks for normality of residuals.

3.7 Data Types and Sources

Secondary published monthly time series data collected from Nairobi City County publications and department of revenue, Budget Speeches, Kenya National Bureau of Statistics, Office of Controller of Budgets, and Central Bank of Kenya will be obtained. The study period covers year 2013-2018 period, which is the period when devolution and fiscal decentralization began in Kenya.

CHAPTER FOUR: EMPIRICAL FINDINGS

4.0 Introduction

The section presents comprehensive analysis of statistical, distributional and monthly time series data which span from July 2013 to December 2018 and the empirical findings.

4.1 Variables Summary Statistics

Table 4.1 gives summary statistics both for logged variables and variables at level.

Table 4.1: Summary Statistics for Logged Variables and Variables at Level

Variables	Obs	Mean	Std.Dev	Min	Max	Skewness	Kurtosis
Local Revenue at level	67	919M	334M	4M	1.99B	1.13	4.269
Log of Local Revenue	67	20.579	0.347	19.808	21.410	0.094	3.094
Human Resource Capacity at level	67	1.25B	278M	6M	1.99B	0.705	3.416
Log of Human Resource Capacity	67	20.924	0.219	20.238	21.413	-0.005	3.520
Debt at level	67	51B	9B	36B	70B	0.346	2.379
Log of Debt	67	24.639	0.176	24.316	24.975	0.019	2.239
Exchange Rate at level	67	97.2	6.8	85.3	105.3	-0.7	1.7
Log of Exchange Rate	67	4.574	0.072	4.446	4.657	-0.688	1.705
Inflation at level	67	6.6	0.97	4.53	8.40	-0.38	3.09
Log of Inflation	67	1.885	0.154	1.511	2.128	-0.819	3.583
Information Technology at level	67	19M	19M	1.2M	81M	1.501	4.33
Log of Information Technology	67	16.254	1.05	14.04	18.21	0.04	2.23
Infrastructure at level	67	41M	1.M	1.9M	8.5M	6.77	5.14
Log of Infrastructure	67	16.8	0.98	14.50	20.57	1.15	5.45

Source: Author calculations using EViews 10

Skewness is an asymmetry measure of the series ' distribution around its mean. Kurtosis is assessed against the normal distribution. It can be mesokurtic distributions (=3). It can also be platykurtic distribution (< 3) or leptokurtic distribution is (>3).

At level, the mean for the local revenue for the period covered is approximately KES 919 Million with the minimum value being KES 4Million and the Maximum value is KES1. 99billion. it is a leptokurtic distribution and highly skewed. The mean of the logged local revenue for the study

period was 20.579 percent, standard deviation of 0.347 percent, minimum and maximum inflation rates of 19.808 percent and 21.41 percent respectively. It is symmetric and a mesokurtic.

The human resource capacity at level has a mean of KES1.25 billion. The minimum is 6 million and the maximum is KES1.99 billion. Skewness is 0.7 meaning that it is symmetric, mesokurtic and normally distributed. The mean of the logged human resource capacity for the period was 20.924 percent, 0.219 percent standard deviation, minimum and maximum of 20.238 percent and 21.413 percent respectively and is also symmetric and a mesokurtic.

At level, debt level has a mean of KES 51 billion with the highest value being KES70billion and the lowest is KES 36billion. 0.34 Skewness means that the series is symmetrical. Kurtosis of 2.3 is <3 therefore a platykurtic. The mean of the log of debt for the study period was 24.639 percent, 0.176 percent standard deviation, minimum and maximum inflation rates of 24.316 percent and 24.975 percent respectively and is also symmetric and a mesokurtic.

The mean of exchange rate is 97.2 with the maximum value of 105.3 and minimum of 85.3. Skewness is -0.7 showing that the series is fairly symmetrical and kurtosis of 1.7 means that it has heavier tail, a platykurtic distribution. The mean of logged exchange rate for the study period was 4.574 percent, standard deviation of 0.072 percent, minimum and maximum of 4.446 percent and 4.657 percent respectively. It is fairly symmetrical and platykurtic.

The mean of logged inflation rate over the study period was 1.88 percent, standard deviation of 0.154 percent, minimum and maximum inflation rates of 1.511 percent and 2.128 percent respectively. It is symmetrical and mesokurtic. Inflation mean at level is 6.6 with the highest of 8.4 and lowest of 4.53, is fairly symmetrical and is mesokurtic.

At level, information technology has a mean of approximately KES 19 million and maximum value of KES 81 million and minimum of KES 1.2 million, is leptokurtic and is highly skewed. The mean of logged information technology for the study period was 16.254%, standard deviation of 1.049 percent, lowest and highest information technology of 14.039 percent and 18.214 percent respectively. It is symmetrical and platykurtic.

Infrastructure at level is highly skewed, leptokurtic with a mean of KES 41million, a maximum of KES 8.5 million and minimum of KES1.9million. The mean of logged infrastructure the study period was 16.798 percent, standard deviation of 0.979 percent, minimum and maximum inflation rates of 14.500 percent and 20.566 percent respectively. It is highly skewed and leptokurtic.

The conclusion here is that ordinary least squares technique cannot be estimated to fit the data therefore the need to use a technique that consider skewed and kurtosis nature of the seies.

4.2 Normality Test Results

We test for normality using Shapiro-Wilk normality test, null hypothesis of which indicates that sample comes from a normally distributed population. Table 4.2 reports normality test result for logged variables while normality test result for the variables at level is shown in Appendix B. When series are not normally distributed, we transform the data. In this case, because of non-normality for most series at level, we expressed them in natural logarithmic form. Recursive residual test in figure 4.2 further shows that residuals are normally distributed since they fall within the acceptance region of $\pm$ 2 standard error. If p. value of Shapiro-Wilk test is higher than 0.05, then data is normal. When it is less than 0.05, data deviates greatly from the normal distribution.

Table 4.2: Shapiro-Wilk Normality Test H_0: p >0.05: Normal Distribution

Variables	Obs	Wald Statistic	V(covariance matrix)	z-statistic	prob> z	Conclusion

Natural logarithm of Local Revenue	67	0.969	1.854	1.339	0.090	Normal
Natural logarithm of the monthly Human Resource Capacity	67	0.976	1.449	0.804	0.211	Normal
Natural logarithm of Debt level	67	0.975	1.463	0.826	0.205	Normal
Natural logarithm of Exchange Rate	67	0.779	13.082	5.577	0.000	Non-normal
Natural logarithm of Inflation	67	0.904	5.693	3.773	0.000	Non-normal
Natural logarithm of Information Technology	67	0.976	1.447	0.802	0.211	Normal
Natural logarithm of Infrastructure	67	0.922	4.629	3.324	0.000	Non-normal

Source: Author calculations using EViews 10

4.3 Results of Unit Root Test

The study conducted ADF test, shown on table 4.3, which is a condition for clear, accurate estimation of time series. Absence means stochastic process is stationary and presence implies stationary of series. Spurious results arise from using non-stationary series and it shows there is a correlation between variables while there is really no relationship at all. Thus, non-stationary data is de-trended.

Table 4.3 ADF Unit Root Test Results

Variables	Augmented Dickey-Fuller Test

	Lag	Test Statistic	p-value for z(t)	Conclusion
Natural logarithm of Local Revenue	0	-6.952*	0.000	I(0)
Natural logarithm of the monthly Human Resource Capacity	0	-6.334*	0.000	I(0)
Natural logarithm of Debt level	0	-4.702*	0.002	I(0)
Natural logarithm of Exchange Rate	2	-1.392	0.854	I(1)
Δ Natural logarithm of Exchange Rate	1	-3.787**	0.024	I(0)
Natural logarithm of Inflation	5	-3.242	0.086	I(1)
Δ Natural logarithm of Inflation	1	-4.037**	0.012	I(0)
Natural logarithm of Information Technology	0	-6.214	0.000	I(0)
Natural logarithm of Infrastructure	0	-6.289*	0.000	I(0)

Note: Δ implies first difference; * and ** implies the null hypothesis is being rejected at 1% and 5% significance level respectively.
ADF critical values at level are 1% (-4.103), 5% (-3.479) and 10% (-3.167).
ADF critical values at first difference are 1% (-4.108), 5% (-3.482) and 10% (-3.169).
Unit root test for the variables was carried out using trend and intercept in both cases.

The series have integration orders; I(0) and I(1) attributable to shocks and time trends. If all variables were I(0) then OLS will be used since variables should act like constants expected in OLS. In our case, if we apply OLS, it leads to spurious result where we wrongly show large t-values and significant results, but this would be exaggerated due to a time variable or where R^2 is greater than Durbin Watson statistics. If all series were I(1) then VECM would have been the appropriate model. Methods like Engel-Granger & Johansen& Juselius (1990) cannot be used. Autoregressive distributed lag (ARDL) approach results to better long-run association.

4.4 Bounds Testing Approach to Co-integration.

If variables are integrated of different orders, bounds test is used. This test is a prerequisite and the first step in using ARDL model approach and it establishes co-integration and long-run association among variables. Bounds test findings are shown in Table 4.4. Appendix C presents ARDL regression.

Table 4.4: Bounds Test Result

F-Bounds Test		H₀: No co-integration; Asymptotic: n=1000		
Test Statistic	**Value**	**Significance level**	**I(0) Lower bound**	**I(1) Upper bound**
F-statistic	8.466	1%	3.15	4.43
k	6	5%	2.45	3.61
Actual sample	67	10%	2.12	3.23

Note: -Sample size <100 compare F-statistics with Narayan (2005) critical values.
-Model was estimated with unrestricted intercept and no trend.
** Variable interpreted as Z = Z(-1) + D(Z).

Ho of no co-integration is dismissed when measured F-statistic is greater than upper bound. Estimated F-statistic, 8.466, is larger than upper bound limits at 1%, 5% and 10%, respectively. Therefore, Ho is rejected. Co-integration and long-term associations exist and therefore the ARDL approach to can be adapted.

We determine optimum lag length (k) by applying order selection criteria like AIC, SBC or HQC. It specifies lags to be incorporated in model. A maximum of four (4) lags was adopted and with the help of AIC. Lag lenght for each variable was automatically selected as (3, 4, 0, 0, 0, 0, 0).

The ARDL model is modified to the ECM when one co-integrating vector exists between variables. The restored result provides the short-run dynamics and long-run association of variables.

4.5 Error Correction Model (ECM)

ECM consists of short run dynamic model and ECT. The ECM is reported in Table 4.5 and presents the significance of variables. It gives short-run relationships coefficients and ECT. ECM tests short-run relationships where the variables are co-integrated. From AIC lag criterion, lag lengths used to establish ECM is (3, 4, 0, 0, 0, 0, 0).

Table 4.5: Estimated short-run coefficients using Error Correction Model Regression

Variable	Coefficient	t-Statistic	p-value
Constant	**39.907**	**8.162**	**0.000**

Note: ECM regression was carried out under the condition of anunrestricted constant and no trend.

	(8.968)		
First difference of natural logarithm of Local Revenue- D(LNLR(-1))	0.423 (0.17)	2.895	0.006
Second difference of Natural logarithm of Local Revenue- D(LNLR(-2))	0.293 (0.119)	2.774	0.008
First Difference of natural logarithm of Human Resource Capacity - D(LNHRC)	-0.133 (0.195)	-0.789	0.433
First Difference of natural logarithm of Human Resource Capacity -D(LNHRC(-1))	0.838 (0.29)	3.741	0.001
Second Difference of natural logarithm of Human Resource Capacity - D(LNHRC(-2))	0.715 (0.25)	3.463	0.001
Third Difference of natural logarithm of Human Resource Capacity D(LNHRC(-3))	**0.650** **(0.19)**	**3.912**	**0.000**
Natural logarithm of Debt level•	**0.562** **(0.25)**	**2.239**	**0.029**
Natural logarithm of Exchange Rate•	**-0.052** **(0.665)**	**-1.268**	**0.211**
Natural logarithm of Inflation•	**-0.069** **(0.33)**	**-1.649**	**0.000**
Natural logarithm of Information Technology•	**1.309** **(0.326)**	**4.010**	**0.01**
Natural logarithm of Infrastructure•	**0.532** **(0.665)**	**0.799**	**0.427**
CointEq(-1)*	**-1.497**	**-8.165**	**0.000**
Goodness of Fit			
R^2	0.683	Mean dependent var	0.005

*, ** and *** represent significant at 1%, 5% and 10% respectively
• Variable interpreted as $Z = Z(-1) + D(Z)$.

Adj. R^2	0.636	Durbin-Watson statistics	1.927
F-statistic	14.544 (0.000)	AIC	0.393
Log likelihood	-3.370	SIC	0.698

The magnitude of ECM is -1.497. This coefficient is less than -1 but not less than -2 which is perfectly fine. Moreover, given the very large t-statistic, -8.165, we can also conclude that the coefficient is highly significant. We infer that short-run association is present for explanatory and dependent variables. Model is stable, but, will simply lead to oscillatory behavior. In other words, model will oscillate above and below the equilibrium value in a dampening fashion until it eventually settles down to the equilibrium path.

Durbin Watson's statistic is 1.927. It is first-order serial correlation analysis and tests the linear association of adjacent residuals from regression model. Absence of serial correlation occurs when DW statistic is about 2.

Standard errors are indicated in parentheses and they evaluate coefficient estimates ' statistical precision and accuracy- higher residuals values imply more numerical noise in calculations. T-statistic checks the hypothesis that the coefficient is 0, which is the ratio of calculated coefficient to standard error. When t-statistic> t-critical (1.96), reject Ho of non-significance. When t-calculated is less than t critical then do not reject Ho and this means that estimated coefficient is as good as zero and the impact of this explanatory variable on dependent variable isn't important.

R^2 is the measure of good fit. 0.683 means that 68.3% of variations in local taxes is illustrated by all independent variables. R^2 should always be greater than Adjusted R^2. The adjusted R^2 is refined version of R^2 that has been modified for number of variables in equation. Adjusted R^2 provides the proportion of variation described by explanatory variables that impacts dependent variable.

F-statistics tests all slope coefficients in the entire model and Ho is that all slope coefficients are zero. If F-calculated/statistic is more than F-critical, we reject Ho. If Ho is estimated, it means we estimate the long regression which is the best since the coefficients are not equal to zero. A t-

statistic indicates if a variable is statistically significant and the F test informs if variables group are all together significant.

Log-likelihood measures fitness of the model. The bigger the number, the better it fits. According to Burnham & Anderson (2002), most statistical programs can display AIC, SIC or log-likelihood, however the values recorded are not always accurate.

Findings indicates that human resource capacity is positively correlated with local taxes. It's effect on tax revenue is positive and statistically significant at a 5% significance level. A rise in human resource capacity by 1 unit results in 0.65-unit growth in local taxes. It's consistent with the results by Chaundry and Munir (2010).

Debt level is positively correlated with local revenue. It's effect on generation of tax income is positive and statistically significant at a 5% significance level. Rise in debt level by 1 unit result in a rise increase local tax revenue by 0.562 units. Previous studies including Clist and Morrissey (2011), Crivelli and Gupta (2014), and Tanzi (1987, 1992) found similar results.

Exchange rate negatively affects local revenue. It's effect on taxes is statistically insignificant at 5% significance level. Rise in exchange rate by 1 unit would result in a reduction in local tax revenue by 0.052 units. Tanzi(1989), Omolo (2012) ,Oloo(2002), Ghura, (1998) and Grindle and Thomas (1991) found similar results.

Inflation is negatively influence local taxes and is statistically significant at 5% significance level. Rise in inflation by 1 unit results in local revenue reducing by 0.069 units. It is due to rise in the living costs combined with reduction in value money which would decrease actual value of the taxes collected. Similar findings have been achieved by Adam et al (2000), Pessino and Fenochietto (2010) ,Tanzi, (1989) , and Nashashibi and Bazzoni (1994).

Information technology positively impact local revenue and is statistically significant at 5% significance level. 1-unit rise in technology results in 1.309 units increase in local tax revenue. It's in line with previous research by Odoyo et al(2013), Githinji et al(2014) and Karimi and Maina(2017) among others.

Infrastructure relationship with local revenue is positive and statistically insignificant at 5 % significance level. 1% rise in infrastructure results in 0.532% increase in local tax revenue.

Bassanini, Scarpetta and Hemmings (2001) and Mwakalobo (2009) found similar results in their studies.

4.6 Post Estimation Test

4.6.1 Residual Serial Correlation Test

An important assumption of Bounds test is that residuals must be serially independent. Autocorrelation-where there is correlation of disturbances across periods-is a potential challenge in time series. The Ho that residuals are serially independent and H_1 is that residuals are either autoregressive (m) or moving average (m), for m = 1, 2, 3,.... The study conducted a test on serial correlation of errors applying Breusch-Godfrey LM test.

Table 4.6: Residual Serial Correlation Test Results

Breusch-Godfrey Serial Correlation LM Test. Dependent Variable: RESID			
Lag	Obs*R^2	Prob. Chi-square	F-statistic
2	1.277	0.528 (0.625)	0.476
4	4.446	0.349 (0.510)	0.835

Table 4.6 shows the F-statistics prob. value is larger than 5% significance level. Therefore, Ho that the residuals are serially uncorrelated is not rejected. This reveals that model under study does not possess serial correlation of residuals.

4.6.2 Residual Normality Test

The recursive residual technique gives a confirmation that residuals are distributed independently and identically. A graphical depiction of residuals normality is shown in Figure.4.2

Figure 1.4: Recursive Residual Test Result
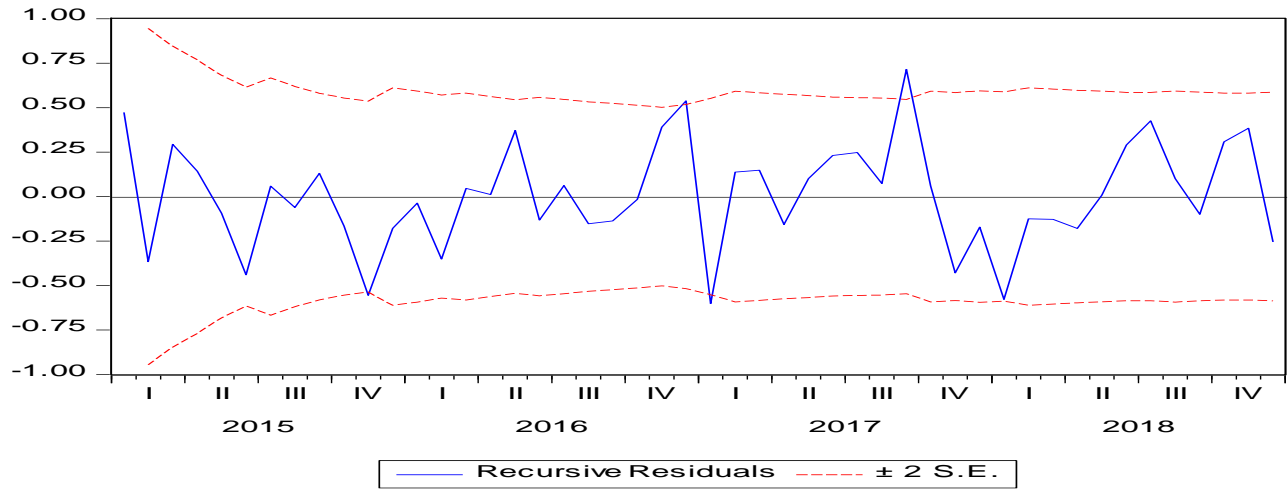
From Figure 1.4, we can see that the residuals are mostly within the acceptance region of ± 2 standard errors. We therefore infer that the residuals are normally distributed and dynamically stable.

4.6.3 Model Stability Test

Stability of the short-run and long-run coefficients is given by cumulative sum of recursive residuals (CUSUM) test highlighted on figure 1.5.

Figure 1.5: CUSUM Test
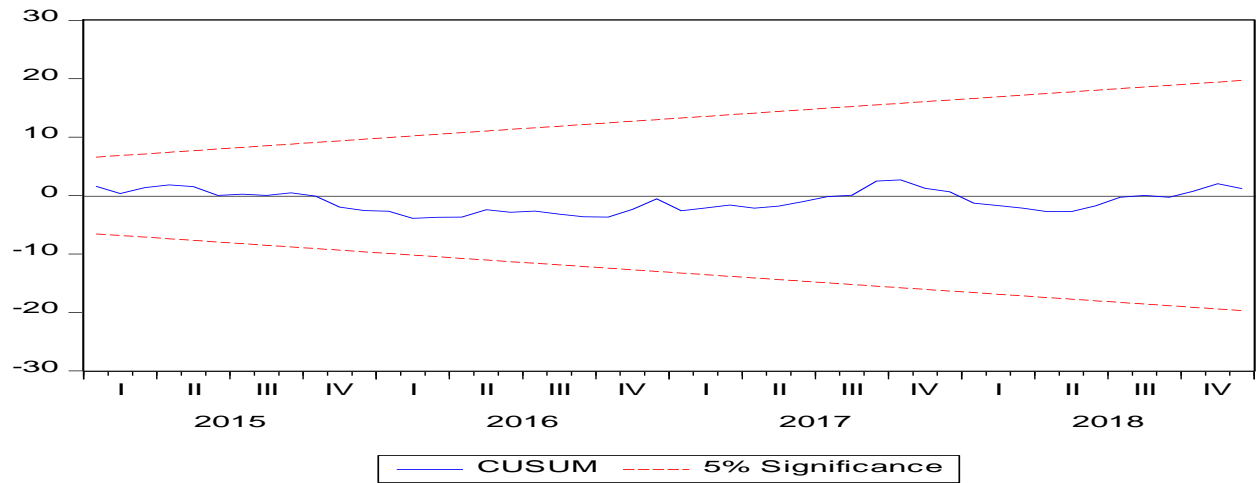
Source: Authors' calculation using EViews 10

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From Figure 1.5model is stable as we can see that the cumulative sum did not exceed the 5% significance limit. CUSUM test confirms that the projected lines are within the critical lines at 5% significance level, thereby demonstrating the stability of short-and long-run variables.

CHAPTER FIVE: CONCLUSION

5.0 Introduction

This section gives the summary of the findings, conclusion, policy recommendation and areas for further research.

5.1 Summary of the Project

Fiscal autonomy of Nairobi City County lies on its ability to increase tax revenue especially from the sources. This paper has attempted to investigate the determinants of local taxes in Nairobi City County from June 2013 to December 2018 using time series estimation techniques examining six variables; human resource capacity, debt, inflation, exchange rate, information technology and infrastructure. Specifically, the aim was to examine the profile, trends and performance of local revenue, their correlates and establishes the short and long-run relationships of determinants. The study first developed a theoretical basis and empirical analysis and then used secondary data collected from Nairobi City County publications and department of revenue, Budget Speeches, Kenya National Bureau of Statistics, Office of Controller of Budgets, Central Bank of Kenya.

Diagnostics tests done were the normality test using Shapiro-Wilk normality test and the unit root test was done ADF test to determine stationarity of series. Bounds test was used to check for co-integration while ECM was used to check short-run relationship of variables. ARDL method was used to determine long-run associations. Post-estimation tests performed included residual serial correlation rest, residual normality test and model stability test using the CUSUM test.

5.2 Conclusion

The profile of local revenue sources in Nairobi city county are; fire inspection fees, land rates, regulation of buildings, decentralization, single business permits, market cess, building permits, rent, advertisement fees, fines and penalties, parking fees, liquor licenses, building (as a percentage of construction cost), parking fees, billboards and advertisements, lease fees, food handlers certification permit, weights and measures, vendor fees, waste collection, rates and other revenues. There has been an upward trend on these revenues from the financial year 2013/2014 to financial year 2017/2018 with the revenue increasing from KES 9.3 billion to KES 11 billion per annum.

The results show that human resource capacity, debt, information technology and infrastructure are all positively correlated to local revenue. Exchange rate and inflation negatively affect local revenue.

Bounds test results show that long-run relationship exists between variables under study. Magnitude of ECM is -1.497 and highly significant. We conclude that there is a short-run association of independent variables and dependent variable. The model is dynamically stable, but will lead to oscillatory behavior where the model will oscillate above and below the equilibrium value in a dampening fashion until it eventually settles down to the equilibrium path.

5.3 Policy Implication

It is clear from the study that the key policy recommendation improving local revenue generation is to increase the use of information technology. Use of computerized and strengthened revenue administrative system improves the efficiency and transparency over paper-based systems and increases tax revenue. Use of software and systems to automate revenue collection the point of source minimizes the incidences of revenue misappropriation, fraud and embezzlement.

Improving the human resource capacity also improves revenue generation. Adequate labour can translates to adequate controls to minimize tax evasion and closing tax loops. For instance, the county government can send their officials into the field to identify and register informal businesses and this updates tax registry and increase taxes collected from unregistered businesses. Well-trained account managers and auditors can provide large taxpayers with differentiated and improved services and this also enhances audit and verification which in turn leads to increased revenues.

The county governments should use borrowings and debt to invest in the sources of local revenues so as to increase the tax base. Investing more in infrastructure has a long-term benefit to the financial situation of the county.

Inflation reduces the tax base. This is because the economic agents would want to protect their wealth and would make a portfolio adjustment so as to favor the assets that will not be taxed heavily.

The government of Kenya should put proper and quality measures to ensure the stability of Kenya shilling against the dollar. The government should put more emphasis on stabilizing the exchange rate since this will prevent significant fluctuation of local revenue attributed to unexpected changes in the exchange rate.

This study recommends that policy makers need to take the macroeconomic variables into account when formulating financial and economic policies which are necessary to encourage local revenue generation.

5.4 Areas for Further Research

Certain macro-economic indicators haven't been included in this review, and this could be a possible area for further analysis.

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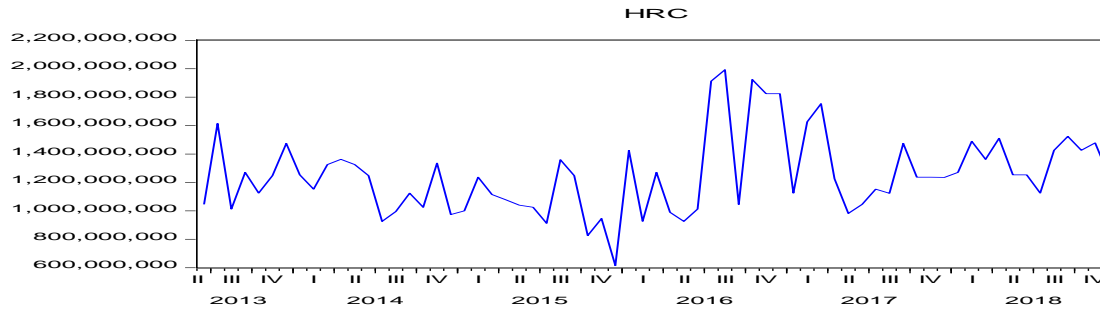
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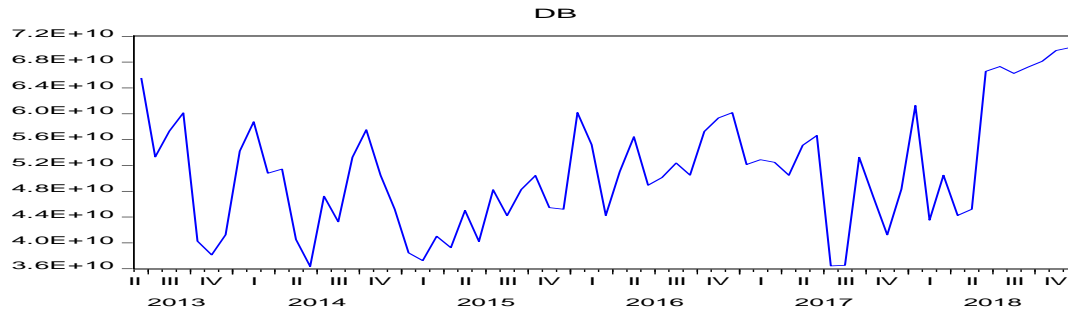
APPENDICES

Appendix A: Graphical Trend Analysis of Variables at Level
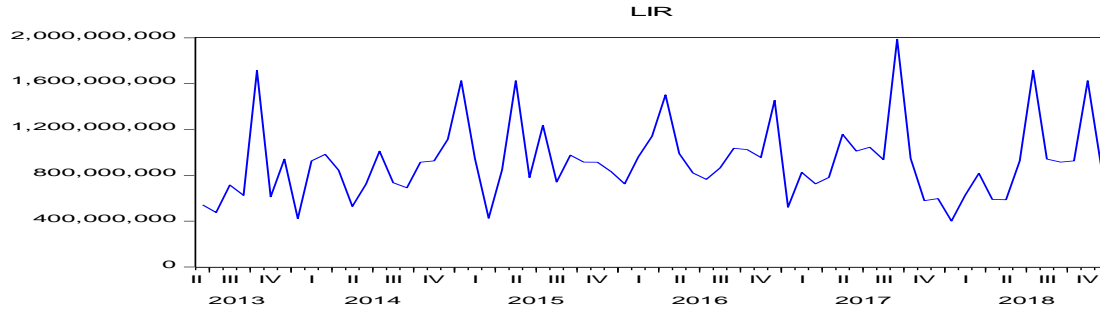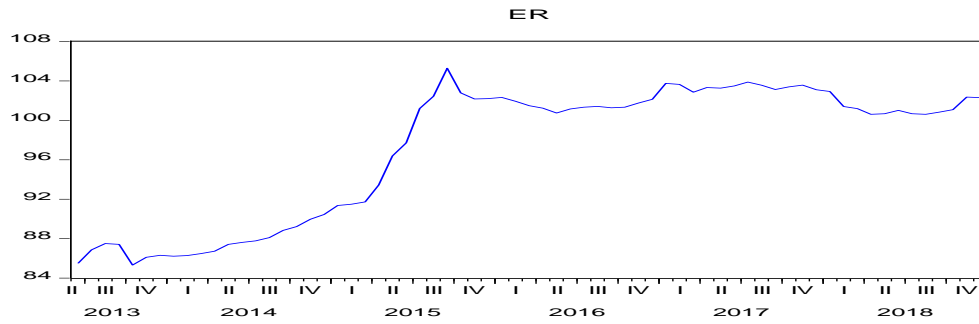

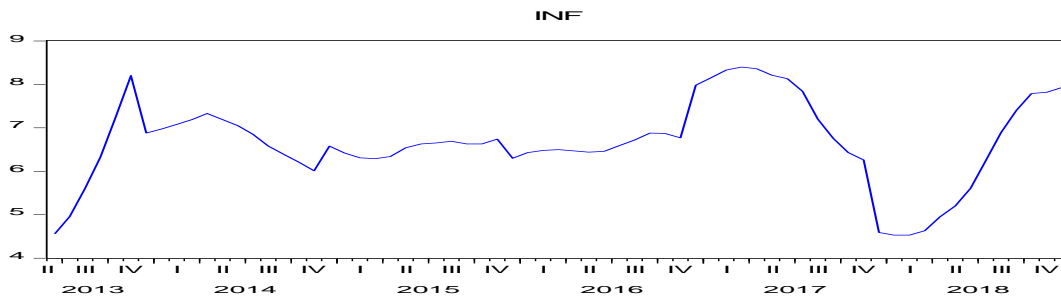*Local revenue*

Human Resource Capacity
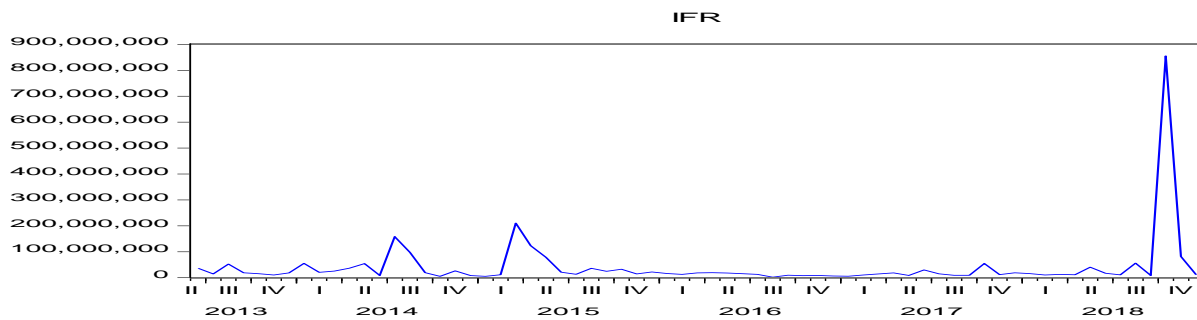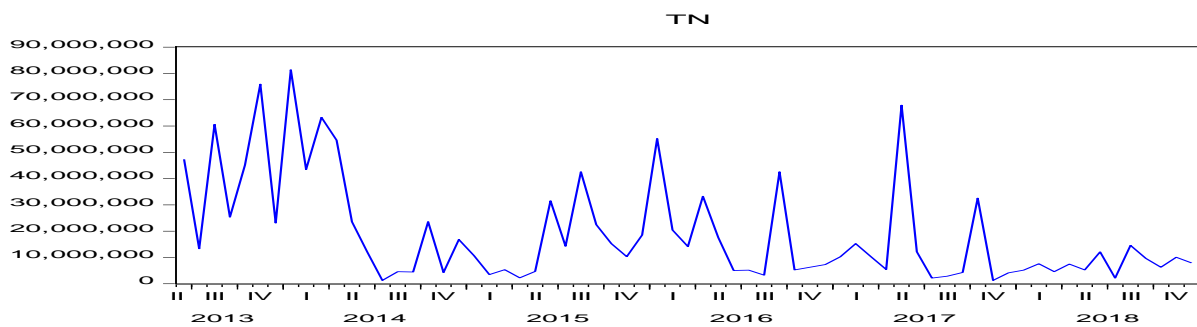

 Debt Level

ER

Exchange Rate

INF

Inflation

IFR

Infrastructure

TN

Information Technology

Appendix B: Shapiro-Wilk Normality Test for Variables at Level

Variables	Obs	W	V	Z	Prob>Z	Conclusion
Natural logarithm of Local Revenue	67	0.89919	5.989	3.883	0.00005	Non-normal
Natural logarithm of the monthly Human Resource Capacity	67	0.95018	2.959	2.354	0.00930	Non-normal
Natural logarithm of Debt level	67	0.96603	2.018	1.523	0.06384	Normal
Natural logarithm of Exchange Rate	67	0.78496	12.774	5.526	0.00000	Non-normal
Natural logarithm of inflation	67	0.93544	3.835	2.916	0.00177	Non-normal
Natural logarithm of Information Technology	67	0.78682	12.664	5.507	0.00000	Non-normal
Natural logarithm of Infrastructure	67	0.28698	42.358	8.126	0.00000	Non-normal

Appendix C: ARDL Regression with 4 Lags

Dependent Variable: LNLR			
Method: ARDL			
Date: 08/29/19 Time: 23s:52			
Included observations: 67			
Maximum dependent lags: 4 (Automatic selection)			
Model selection method: Akaike info criterion (AIC)			
Dynamic regressors (4 lags, automatic): LNHRC LNDB LNER LNINF LNTN LNIFR			
Number of models evalualted: 62500			
Selected Model: ARDL(3, 4, 0, 0, 0, 0, 0)			

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNLR(-1)	-0.074	0.121	-0.608	0.546
LNLR(-2)	-0.130	0.128	-1.012	0.317
LNLR(-3)	-0.293	0.119	-2.441	0.018
LNHRC	-0.133	0.195	-0.682	0.498
LNHRC(-1)	-0.266	0.191	-1.391	0.171
LNHRC(-2)	-0.123	0.191	-0.645	0.522
LNHRC(-3)	-0.065	0.187	-0.346	0.731
LNHRC(-4)	-0.650	0.189	-3.422	0.001
LNDB	0.562	0.251	2.239	0.029
LNER	-0.052	0.041	-1.268	0.211
LNINF	-0.069	0.042	-1.649	0.106
LNTN	1.309	0.326	4.010	0.000

LNIFR	0.532	0.668	0.799	0.427
C	39.909	8.968	4.449	0.000
R-squared	0.427	Mean dependent var		20.604
Adjusted R-squared	0.260	S.D. dependent var		0.339
S.E. of regression	0.292	Akaike info criterion		0.583
Sum squared resid	4.105	Schwarz criterion		1.093
Log likelihood	-3.370	Hannan-Quinn criter.		0.784
F-statistic	2.557	Durbin-Watson stat		1.927ss
Prob(F-statistic)	0.008			