EFFECT OF COUNTY BUDGET DEFICITS ON GROSS COUNTY PRODUCT IN KENYA

BY

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DECLARATION

This thesis is my original work and has not been presented for an award of a degree in any other University. All sources of information have been duly acknowledged through referencing.

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Since not all can be mentioned here due to space, allow me to pen off by saying, "May God, the Almighty, richly bless you all."

DEDICATION

To Eva, Silvia and Delvin.

ABSTRACT

Globally, the performance of any economy is determined by the proportion of productive resources available to support its needs. Low resource base compared to needs of any economy, contribute to economic instability, which is a major concern for many countries. Since Kenya established county governments in 2013, these counties have been registering an increase in their budget deficits. Between 2013 to 2017, total county own sourced revenue deficit increased from 16,528 to 25,081 million shillings; total county development budget deficit increased from 48,701 to 68,993 million shillings; and total county recurrent budget deficits increased from 14,965 to 21,166 million shillings. These counties developed their County Integrated Development Plans (CIDPs 2013-2017) to guide their efforts towards economic growth. Within the period, the counties economies grew from 4,263,910 in 2013 to 7,524,710 million shillings as indicated in their Gross County Product -a geographic breakdown of Kenya's GDP that gives an estimate of the size and structure of county economies. It was important to understand how each of these county budget deficits affect economic growth of counties in Kenya. However, literature shows no consensus whether budget deficits have negative or positive effect on economic growth. These studies, including those done in Kenya limited their scope to use of national level data set, with budget deficits not broken down to own sourced revenue deficit, development budget deficit or recurrent deficits. The purpose of this study was to analyze the effect of county budget deficits on Gross County Product in Kenya. Specific objectives were to; determine the effect of own sourced county revenue deficit on GCP, establish the effect of county development budget deficit on GCP, and examine the effect of county recurrent budget deficit on GCP. The study was modeled on neoclassical economic growth theory of Solow and Swan and correlational research design was employed. Secondary panel data from 2013 to 2017 for all 47 counties was used (235 observations), sourced from Kenya National Bureau of Statistics and Controller of Budget reports. The data was analyzed using panel estimation method of Random Effects model, which was preferred by the Hausman test and used to estimate and interpret results of autoregressive distributed lag model (ARDL). On the first objective, findings showed that own sourced county revenue deficit had a coefficient of -0.45 with a p-value of 0.013, while the coefficient for its lagged value was-1.03 with a p-value of 0.003. This means that increase in growth rate of own sourced county revenue deficit in the past as well as in the present period have a negative effect on growth rate of Gross County Product. On the second objective, county development budget deficit reported a coefficient of 0.21 with p-value of 0.056 while the coefficient of its lagged value was 0.06 with a p-value of 0.001. This implies that growth in the rate of county development budget deficit of the past had a positive effect on growth rate of Gross County Product. Findings for the third objective showed that county recurrent budget deficit had a coefficient of -0.13 with a p-value of 0.022 and its lagged value had a coefficient of -0.07 with the p-value being 0.110. The results imply that growth in the rate of county recurrent budget deficit in the current period was having a negative effect on the growth rate of Gross County Product. Based on these findings, the study concluded that past as well as present increase in growth rate of own sourced county revenue deficit reduces growth rate of Gross County Product, an increase in growth rate of county development budget deficit in the past increases growth rate of Gross County Product and an increase in growth rate of county recurrent budget deficit in the present period lowers growth rate of Gross County Product. As such, this study recommended for policies that improve own sourced revenue collection, enhance development spending and reduce recurrent deficit spending at county levels.

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
CBD	County Budget Deficit
CGE	County Government Expenditure
CIDPs	County Integrated Development Plans
COB	Controller of Budget
DBD	County Development Budget Deficit
EGLS	Estimated Generalized Least Squares
FM-OLS	Modified Ordinary Least Square
GCP	Gross County Product
GDP	Gross Domestic Product
KNBS	Kenya National Bureau of Statistics
KPSS	Kwiatkowski–Phillips–Schmidt–Shin
KES	Kenya Shillings
LLC	Levin–Lin-Chu
LRD	Own Sourced County Revenue Deficit
MENA	Middle East and North African countries
MTP III	Third Medium Term Plan
OLS	Ordinary Least Squares
PP	Phillip-Perron
RBD	County Recurrent Budget Deficit
VECM	Vector Error Correction Model
VIF	Variance Inflation Factor

OPERATIONAL DEFINITION OF TERMS

Gross County Product: This is the measure of each county's contribution to Gross Domestic Product (GDP) in Kenya. According to KNBS (2019), GCP is an estimate of the size and structure of county economies and offers a benchmark for evaluating each county's economic growth over time.

County budget deficits: These are the differences between each county's budget estimates and actual budgetary support received by county governments from the national government. The specific budget deficits are as defined below;

Own sourced county revenue deficit: This is the difference between projected own sourced revenue and actual own sourced revenue collected by each county in a financial year.

County development budget deficit: The difference between approved budget allocation for development expenditure and actual receipts for such expenditure by each county in a financial year.

County recurrent budget deficit: The difference between approved budget allocation for recurrent expenditure and actual receipts for such expenditure by each county in a financial year.

County population: This is the projected total number of persons within each county for each of the years under study. It was used as a proxy for labor force.

County development expenditure: This is the actual development expenditure incurrent by each county government in millions of Kenya shillings. It was used as a proxy for capital stock.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Globally, the performance of any economy is guided by the proportion of productive resources available to support its needs. With time, these needs usually grow, while available resources dedicated towards such needs are always insufficient. This has a bearing on growth prospects. Low resource base in relation to the needs of any economy, contribute to economic instability. This instability has become an issue of concern for many countries in the world, with budget deficit noted as the main issue behind economic instability (Osoro, 2016). Fischer (1993), Ramu, *et.al* (2016)and Eminer, (2015) emphasize that budget deficit is one of the most important variables that influence economic growth. In Kenya, since inception of the County governments in 2013, each county has been registering its contribution to the national Gross Domestic Product (GDP). This contribution is measured by Gross County Product (GCP). According to KNBS, (2019), GCP is a geographic breakdown of Kenya's Gross Domestic Product (GDP) that gives anestimate of the size and structure of county economies. It also provides a benchmark for evaluating the growth of county economies over time.

A budget deficit stems from the inability by a government to collect enough taxes or increased government spending or both. It is, therefore, possible to conclude that budget deficit occurs as a result of government fiscal policy. Since Kenya is a developing country, its budget deficit could be explained to exist as a result of massive government spending, in comparison to low own sourced revenue generated to achieve its economic goals. Brender, (2008), explained that developing countries prefer expansionary fiscal policies, unlike developed nations, whose preference is low inflation. His findings assert that recurrent deficits are harmful to the economy. As developing countries go for expansionary fiscal policies, Gupta *et al.* (2005), observe that higher budget deficit does not always have a negative impact on the economy. They state that even if spending is too high, but is utilized for capital expenditure, then such deficit spending will contribute positively to GDP growth. Their argument imply that recurrent budget deficit is detrimental to economic growth.

Moraa (2013) observe that the increasing gown sourced revenue deficit in Kenya, has resulted to weak economic performance. This situation forces the economy to generate inadequate resources for the public budget, thereby resulting to debt accumulation, associated with high interest rate. This is supported by Eli (2010), who argued that mismatch between public expenditure and own sourced revenue stagnates growth. Karnik (2002), in his analysis considering data between 1980-81 to 1996-97, proved that own sourced revenue deficit had an adverse effect on the growth rate of state domestic product in India. Ramu, *et.al*,(2016) also found that development budget deficit had a positive effect on GDP, while own sourced revenue deficit had an adverse effect on GDP in India. This is explained by Rangarajan and Srivastava, (2005)who observed that when own sourced revenue deficit rises, government savings and capital expenditures fall. This widens the development budget deficits and recurrent budget deficits and cause a fall in growth rate. Most of these scholars focused their studies at the national level data set. The studies ignored the effect of each of these budget deficits – own sourced revenue deficit, development budget deficits and recurrent budget deficits on economic growth at the local governance level.

1.1.1 Gross County Product and County Budget Deficit Components in Kenya

The actual implementation of County governance system in Kenya began in 2013, after the August general elections, which effectively actualized the 47 County governments. This election set the stage for full fiscal, administrative as well as political autonomy for each of the 47 county governments. The 2010 Kenya constitution further fixed a minimum of 15% of audited accounts of previous financial year of national government revenue to be allocated to

Counties. Counties in Kenya draw their revenue from four principal sources; (a) the equitable share of national government revenue, (b) conditional grants from national government, (c) own sourced revenue generated by each county government, and (d) loans and grants from development partners. As indicated in the Controller of Budget Reports 2013/2014 to 2017/2018, county government expenditures are ever growing. However, all the counties have own sourced revenue structures that do not yield enough revenue, resulting to persistent county budget deficits.

Figure 1 gives the components of total county budget deficits in millions of shillings for all the 47 counties, over the past five financial years. These components are county own sourced revenue deficit (LRD), county development budget deficit (DBD), and county recurrent budget deficit (RBD). The figure shows that between 2013/2014 and 2017/2018 financial years, these budget deficit components registered a dwindling performance. From 2013/2014 to 2014/2015, the county own sourced revenue (LRD) reduced from 27,912 to 16,528million shillings, then increased steadily from 15,518 to 25,081million shillings between 2015 to 2016, before dropping to 16,427 in 2017/2018 financial year. On its part, the county development budget deficit increased steadily from 47,325 to 50,866 million shillings between 2014/2015 and 2015/2016 financial year, dropped to 46,748 million shillings in 2016/2017 before increasing to 68,993 million shillings in 2017/2018 financial year. Between 2013/2014 and 2015/2016 financial years, total county recurrent budget deficit (RBD) reduced from 23,301 to 13,100 million shilling, then increased steadily from 13,100 to 21,166 million shillings from 2014/2015 to 2017/2018 financial years. According to Controller of Budget Report, (2018), the dwindling trend of county development budget deficits and recurrent budget deficits was blamed on delays in disbursements by the National Treasury and high recurrent expenditures by the county governments. At the same time, the report highlighted underperformance of own sourced revenue collection as the main cause of own sourced revenue deficits.

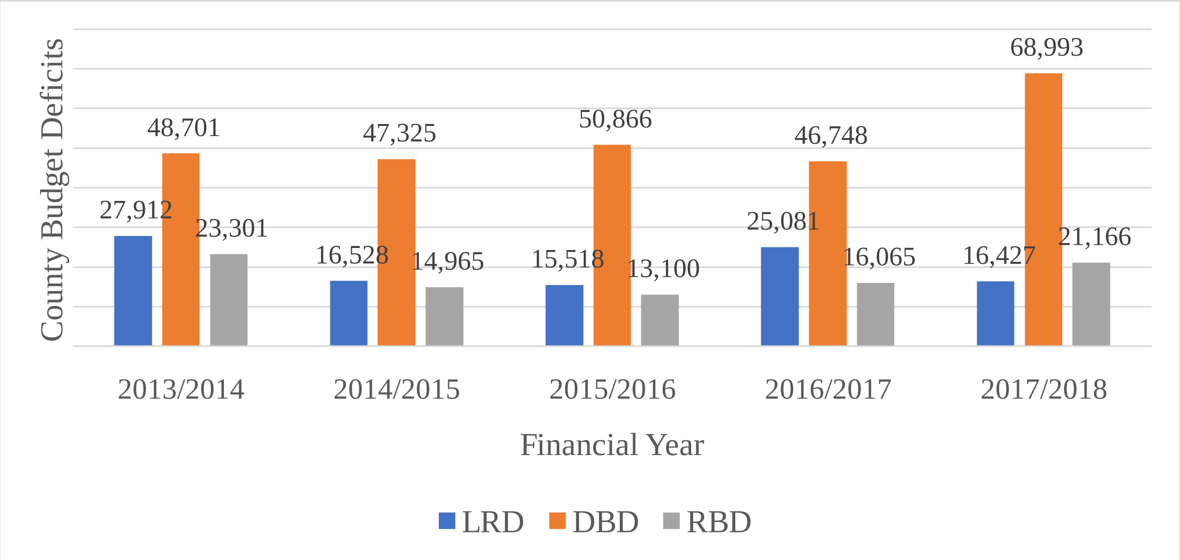

Figure 1: County Budget Deficit Components from 2013/2014 to 2017/2018

Source: COB Reports, (2013/2014 to 2017/2018)

Figure 2 gives the total Gross County Product (GCP) in millions of shillings for all the 47 counties over the past five financial years. The figure shows that between 2013 and 2017, the GCP increased steadily from KES. 4,263,910million to KES. 7,524,710. This could be attributed to the agriculture and services sectors, which according to KNBS (2019), accounted for the largest share of GCP in most of the counties. As observed by KNBS (2019), counties with improved economic activities such as agriculture, manufacturing, real estate and such services as transportation, financial, wholesale and retail trade, contributed a larger portion of GCP.

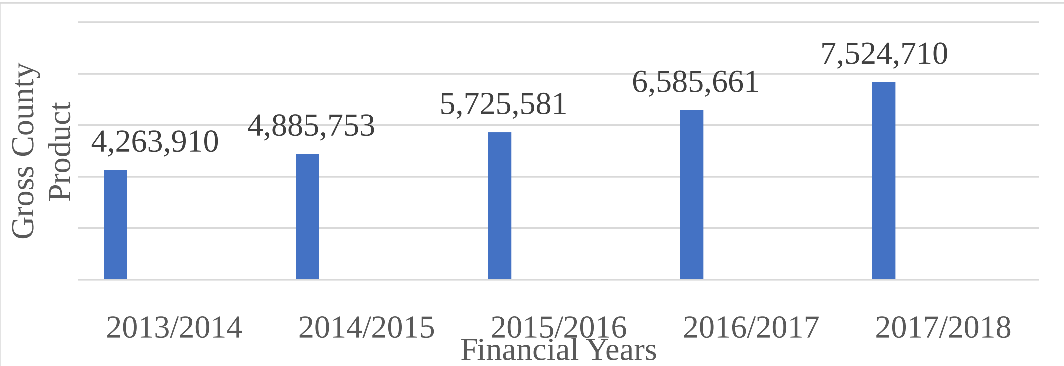

Figure2: Gross County Product from 2013/2014 to 2017/2018

Source: COB Reports, (2013/2014 to 2017/2018)

At the global level, the concern about the effect of budget deficits on GDP growth has continued over time, among economists and policy makers due to its macroeconomic effects, Olomola *et. al*,(2004). The contribution of budget deficit towards GDP was first envisaged by Keynes, (1936). He suggested that budget deficit contribute positively to GDP growth during recession. According to him, during recession, private sector spending falls and saving rises, leading to unemployed resources. At this point, government borrowing becomes necessary to put into use the unused saving and jump start the economy. Such deficit spending promotes higher growth, which results to higher tax revenue and finally reduce budget deficit with time Keynes, (1936).

While several researchers have studied the effect of budget deficit on GDP, there is no consensus on whether this effect is positive or negative. For example, studies by Odhiambo *et.al,* (2013) in Kenya and Risti, *et.al,* (2013) in Romania, found a positive effect ofbudget deficit on economic growth. Authors such as Tsegba, *et.al,* (2012) in Nigeria, Fatima, *et.al,* (2012) in Pakistan, Afonso, *et.al,* (2011) studying 155 countries, Wu, *et.al*, (2011) in Malaysia and Adak, (2010) in Turkey found a negative effect. On the other hand, studies by Eminer (2015) in North Cypress and Iya, *et.al,* (2014) in Nigeria found a neutral effect. These studies did not consider the various components of budget deficits and concentrated on national level data set. This made it impossible to draw a conclusion on the effect of budget deficit components on economic growth at the county level. In view of this fact, there was need to analyze the effect of county budget deficit components on Gross County Product in Kenya. This study considered own sourced county revenue deficit, county development budget deficit and county recurrent budget deficit and their effect on Gross County Product in Kenya.

1.2 Statement of the Problem

Since Kenya established county governments in 2013, the counties have been registering an increase in their budget deficits. Between 2013 to 2017, county own sourced revenue deficit increased from 16,528 to 25,081 million shillings; county development budget deficit increased from 48,701 to 68,993 million shillings; and county recurrent budget deficits increased from 14,965 to 21,166 million shillings. These county governments developed their County Integrated Development Plans (CIDPs 2013-2017) to guide their efforts towards economic growth. Within the period, counties economies grew from 4,263,910 in 2013 to 7,524,710 million shillings in 2017 as indicated in their Gross County Product. To achieve this growth the national government continued to channel budgetary support to counties. However, the increasing budget deficits continue to worry economists and policy makers keen on maintaining stable economies of counties in Kenya. It was important to understand how each of these county budget deficits affect economic growth of counties in Kenya. It is evident that several studies on the effect of budget deficits on economic growth have been done, yet no consensus has been reached as to whether these deficits have positive or negative effect on economic growth. Available studies including those conducted in Kenya, have focused on national level data set, with budget deficits not broken down to own sourced revenue deficit, development budget deficit or recurrent deficits. This makes it difficult to draw inferences on how county budget deficits affect Gross County Product. To address this gap, this study was designed. Its purpose was to analyze the effect of county budget deficits on Gross County Product in Kenya. The county budget deficits were broken down into own sourced county revenue deficit, county development budget deficit and county recurrent budget deficit. The study findings will provide important information on how these county budget deficits affect Gross County Product in Kenya, and aid the management of county budget deficits for the sake of improving GCP.

1.3 Objectives of the Study

1.3.1 General Objective

To analyze the effect of county budget deficits on Gross County Product in Kenya

1.3.2 Specific Objectives

The specific objectives of this study were to:

i. Determine the effect of own sourced county revenue deficit on Gross County Product of counties in Kenya
ii. Establish the effect of county development budget deficit on Gross County Product of counties in Kenya
iii. Examine the effect of county recurrent budget deficit on Gross County Product of counties in Kenya

1.4 Research Hypothesis

The study focused on the following hypotheses for each objective.

i. H_o: There was no effect of own sourced county revenue deficit on Gross County Product of counties in Kenya
ii. H_o: There was no effect of county development budget deficit on Gross County Product of counties in Kenya
iii. H_o: There was no effect of county recurrent budget deficit on Gross County Product of counties in Kenya

The rejection of the null hypothesis implied existence of an effect or an impact of county budget deficits on Gross County Product of counties in Kenya.

1.5 Study Justification

The county governments developed their CIDPs and were expected to contribute to higher growth, as targeted in the current national Medium-Term Plan (MTP III) for Kenya, KNBS (2019). Due to this, counties continue to receive increasing budgetary allocation from the national government. However, as these transferred revenues grow, counties also register deficits. It was therefore important to understand how these deficits relate to Gross County Product. While literature show unending debate on this effect, the debate concentrated at the national government rather than county government level. The empirical findings of this study will guide the policy agenda for managing county budget deficits and improving Gross County Product towards the national growth targets as set in MTP III and vision 2030. The study is relevant to both the county governments and the national government since its findings will help in reducing persistent tension in revenue sharing between the two levels of government. The study is also relevant to the academia by adding literature to the ongoing debate, specifically from the county government perspective.

1.6 Scope of the Study

This study involved all the 47 counties, which came to existence in Kenya from 2013, in line with 2010 constitution. Panel data spanning 5 years from 2013 to 2017 was considered, as provided by KNBS and COB reports.

1.7 Theoretical Framework

Theoretical framework is the structure that supports a research study. The study was modeled on the Solow- Swan’s Neoclassical Growth Theory to aid it in selecting study variables, testing hypotheses and conformity to economic a priori expectations. Lubega, (2017), opines that Solow Swan’s Growth Model was an extension of Harrod-Domar model, which considered two factors production function, with capital and labor determining output level. A third factor, technology, which in theory is determined exogenously, was added to the production function. In their model, Solow- Swan allowed for the substitution between capital and labor. Separately, capital and labor exhibit diminishing returns to scale, while jointly exhibit constant returns to scale. The progress in technology was a residual factor which explains the long run growth. The model assumed the standard Cobb Douglas aggregate production function, represented as follows:

$$Y\ (t) = AK\ (t)^{\propto} L\ (t)^{1-\propto} \qquad , 0 < \propto < 1 \tag{1.1}$$

Where Y is output, K is capital stock, L is labor force, A is the technical factor productivity and ∝ signified elasticity of output with respect to capital. Any improvement in the level of technology shifts the production function higher. This means that the capital stock is an important contributor to the output growth. With this, then we can concentrate on capital accumulation over time. Whereas not all output was consumed, means a fraction of output was saved, as capital. If it's assumed that "c" is the fraction of output (cY) consumed and "s" is the fraction of output (sY) saved, as capital with "δ" as a constant rate of depreciation of this capital stock (δK), then

$$K_t = sY_t - \delta K_t, \text{ where } K_t = \frac{\delta K_t}{\delta_t} \tag{1.2}$$

Where sY_t denotes aggregate saving and δK_t aggregate depreciation of capital over time period (t). The output that was neither used for consumption nor replacing the depreciated old capital goods is the net investment. Because the production function in Solow's model exhibits constant returns to scale, it can be specified as output per unit labor in the long run analysis, as given below;

$$Y_t = \frac{{K_t}^{\propto} A_t {L_t}^{1-\propto}}{A_t {L_t}^{1-\propto}}$$

Thus $Y_t = {K^{\propto}}_t$ (1.3)

Where Y_t is the output over time t, and ${K^{\propto}}_t$ is the net investment (capital accumulation) over time t.

Considering our economic theory, net investment (capital accumulation) promotes economic growth. Since government budget supports investment, budget deficits will affect economic growth. Integrating the budget deficit in the model, becomes

$$Y_t = \text{f}({\phi^{\beta}}_t) \tag{1.4}$$

Where Y was the output and ϕ was the budget deficit. Because the study considered panel data set with different county budget deficit components, model (1.4) was expanded to capture all these components, as specified below;

$$Y_{it} = AK_{it}{}^{\alpha} L_{it}{}^{\psi} DBD_{it}{}^{\beta} LRD_{it}{}^{\eta} RBD_{it}{}^{\rho} \tag{1.5}$$

Where,

Y_{it} represented the Gross County Product (GCP)

A represented the factor productivity which was assumed to have a positive effect on growth

K_{it} represented county development expenditure which was assumed to have positive effect on growth

L_{it} represented county population (county labor force) also having a positive effect on growth

DBD_{it} represented county development budget deficit, assumed to have a positive effect on growth

LRD_{it} represented own sourced county revenue deficit, assumed to have a negative effect on growth

RBD_{it} represented the county recurrent budget deficit, also assumed to have a negative effect on growth

Model (1.5) was then transformed into the logarithm form, specified below;

$$lnY_{it} = A_0 + \alpha lnK_{it} + \psi lnL_{it} + \beta lnDBD_{it} + \eta lnLRD_{it} + \rho lnRBD_{it} \tag{1.6}$$

This model (1.6) was used to establish the effect of county budget deficits on Gross County Product in Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presented a review of related literature, both theoretical and empirical by economists on the effect of budget deficit on economic growth. The chapter described two main theories relating budget deficits and economic growth. They were the Solow- Swan Neoclassical Economic Growth Model and the AK Growth Model. It also discussed various empirical literature analyzing the effect of budget deficit on economic growth. The section finally ended with a summary of both theoretical and empirical literature, clearly outlining existing gaps in literature.

2.2 Theoretical Literature

According to Piętak, (2014), Buscemi and Yallwe, (2012), the neoclassical model developed by Solow, (1956) and Swan, (1956) and the endogenous growth models by Romer, (1986) and Lucas, (1988) form the two general categories that economic growth models can be classified.

2.2.1Solow- Swan Neoclassical Economic Growth Model

According to Pietak, (2014) and Aghion and Howitt, (2009) any study of economic growth starts with the neoclassical growth model developed by Solow and Swan (1956). The model analyses the long run economic growth by considering capital accumulation, population growth (proxy for labor force) and technological progress (increase in productivity). According to Lubega, (2017) the model was built from Harrod- Domar model, which had labor as a factor of production and assumed a fixed capital output ratio. This was contradicted by Solow- Swan model, which emphasizes on role the of capital accumulation, further arguing that capital output ratio is not fixed. Solow and Swan introduced the assumption that it was possible to substitute capital and labor. As such, their model exhibited diminishing returns to capital and labor separately, but constant return to the two factors jointly. The argument by Solow and Swan, was that only technological progress, (assumed to be exogenously determined by other growth theorists also), explain the long run growth.

The growth model of Solow and Swan, assumes a standard production function of the form;

$$Y = AK^{\propto}L^{1-\propto} \qquad (2.1)$$

Where Y is the output, K is the capital stock, L is labor, A is the technical factor productivity and grows exogenously. Since productivity and population (AL) are assumed to grow at an exogenous and a constant rate,

Then L(t) = K (2.2)

Equation (2.2) represents the compounded labor force growth rate from period (0) to period (t). This equals capital, implying that capital stock is a major determinant of long run output growth. This gives an opportunity to concentrate on capital accumulation.

Considering the fact that not all output is consumed, as only a fraction (cY) is consumed, means that a fraction of capital (sY) is saved as capital (investment). The capital stock also depreciates (wears out), at a constant rate (d). Part of output which is neither used for consumption nor replacement of depreciated old capital goods is the net investment.

The weakness of Solow – Swan model is that it considers technological progress as the main determinant of growth, without explaining the sources of such improvement in technology. The model was, however, relevant to the present study since it considered capital stock as a major input that determines economic growth. Because net investment is the rate of growth in capital stock, with neoclassical theory assuming that budget deficit crowds out investment, the model becomes ideal and was used for this study.

2.2.2AK Growth Models

Aghion and Howitt (2009) considered AK as an endogenous growth model, whose production function was assumed to exhibit no diminishing returns to capital. Because the standard exogenous neoclassical growth models were seen to be theoretically inadequate in explaining the long run growth, Paul Romer developed the AK model in 1986. The model lumps human and physical capital together, making it not distinguish between capital accumulation and progress in technology. Since capital accumulation occurs with progress in technology, lumping physical and human capital together, make it difficult for the diminishing returns to force its marginal product to zero. It is worth noting that part of the accumulation of technological progress was needed so as to counteract the diminishing returns.

Below was the production function in the AK model

$$Y=AK \tag{2.3}$$

Where,

Y is the output

A is the level of technology

K is the capital stock, both human and physical

The AK model assumes no depreciation of capital and that labor force grows at a constant rate, denoted by (n).

According to the model, an increase in the rate of investment proportionally stimulates growth rate of per capita income. This implies that investment enhancing policies ultimately improve economic growth prospects and vice versa. The constant returns to scale assumption was the major drawback of this model, since many economists were skeptical about the validity of this assumption. However, the AK model satisfactorily explained growth in the long run by avoiding diminishing returns of capital in the long run in its endogenous growth.

2.2.3. The Keynesian Theory of Economic Growth

According to the Keynesian economics, government involvement in the economy is paramount for any economic growth. Hussain, (2017) notes that in Keynesian economics, government expenditure is an important component of aggregate demand in the economy. Whenever aggregate demand falls, the government can increase its expenditure. This in turn will increase aggregate demand thereby stimulating economic growth. Biplob, (2019) also notes that according to Keynesians deficit financed government spending can boost economic activities. This creates an incentive for the business sectors to expand their operations, while moving towards profitability. This is known as the “crowding-in” effect. According to Hussain, (2017) this approach was clearly demonstrated in United States when the government stimulus improved the output, employment and income. It rejuvenated the U.S. economy from the effects of the Great Depression of 1929 to 1933 and also during the most recent Great Recession of 2007 to 2009. The same practice has been followed by several governments in different countries over the years to stimulate aggregate demand and the pace of their growth. The weaknesses of this economic thought is that increasing budget deficit in recession causes crowding out. This is because as the government borrows more to sustain its spending, the interest rates rise and inhibits investment.

2.2.4. Ricardian Equivalence Hypothesis

The Ricardian Equivalence postulates that budget deficit cannot stimulate economic growth. The argument is that if economic agents are rational, then they will see increased deficit as increase in future taxes, whose present value is equivalent to the value of the deficit. This school of thought contends that increased budget deficits as a result of increased government spending, must be paid for either now or later. This payment must be with the aggregate present value of receipts settled by the aggregate present value of spending. In the same way, a decrease in the present taxes must be matched by an increase in future taxes. This leaves the costs of financing as well as private investment, the same. As such, economic agents will act as if the deficits do not exist. The consumers and investors will therefore ignore the government stimulus, Kurantin (2017) and Molefe*et.al,* (2017).

2.3 Empirical Literature

This section reviewed empirical work by different researchers on the effect of budget deficits on economic growth, as well as highlighting the gaps in their findings.

2.3.1 Budget Deficits and Economic Growth

The literature on budget deficits and economic growth vary in terms of country studies, cross country studies, methodologies and findings. The recent empirical literature which have examined this area of study include (Biplob, 2019 in Bangladesh; Tung, 2018 in Vietnam;Hussain, 2017 in Bangladesh; Molefe, *et.al*, 2017 in South Africa; Arjoman, *et.al*, 2016 in ten MENA countries; Ramu, *et.al*, 2016 in India; Haider, *et.al*, 2016 in Bangladesh; Rana and Wahid, 2016 in Bangladesh; Navaratnam and Mayandy, 2016 in five countries in Southern Asia; Nayab, 2015 in Pakistan; Edame and Okoi, 2015 in Nigeria; Hassan, *et.al,* 2014 in United States; Cinar, *et.al*, 2014 in ten Eurozone countries; Odhiambo, *et.al*, 2013 in Kenya and Fatima, *et.al*, 2012) in Pakistan. These studies used different methodologies, which include Ordinary Least Squares (OLS), Fully Modified Ordinary Least Squares (FM-OLS), Estimated Generalized Least Squares (EGLS), Vector Autoregression (VAR), Vector Error Correction Mechanism (VECM) and the Autoregressive Distributed Lag(ARDL). In addition, most of these studies focused used national level data, with aggregate data for the budget deficits considered. This shortcoming made it difficult to draw conclusions on the effect of specific budget deficit components on economic growth of devolved governments in Kenya. This motivated the current study to consider county government data set, with budget deficits broken down to own sourced county revenue deficit, county development budget deficit and county recurrent budget deficit.

Biplob, (2019) investigated the impacts of budget deficit on economic growth in Bangladesh, using annual time series data covering the period 1981 to 2017. The study variables were GDP, budget deficit and government total expenditure. The broad money supply, inflation, real exchange rate, real interest rate and gross capital formation as a percentage of GDP, were used as control variables. The autoregressive distributed lag (ARDL) and Vector Error Correction Models (VECM) were used. The results revealed a positive impact of budget deficit on economic growth, both in the long-run and short-run. Results of Granger causality tests conducted under VECM found a unidirectional causality, which move from budget deficit to economic growth. The fact that this study relied on national level data set, made it not able to predict effect of budget deficits on economic growth at the devolved governance level. At the same time, it did not segregate budget deficits into different components. The present study will address these weaknesses by using panel data and segregating budget deficits into different components while focusing on devolved governance units in Kenya.

In Vietnam, Tung, (2018) examined the effect of fiscal deficit on economic growth, adynamic emerging country, but with large budget deficits for many years. The study considered GDP, private investment, foreign direct investment, budget deficit and net exports. Quarterly time series data from 2003 to 2016 was collected. OLS and ECM were applied, which found a negative effect of budget deficit on economic growth in both short and long run, in solidarity with neoclassical theory. The findings, in addition, revealed a long run relationship between budget deficit and economic growth. The study used national data set. This rendered it inadequate to generalize its findings to the context of county governments in Kenya. The study also left a gap on budget deficit components. This gap was addressed in the present study by considering county level data set, with budget deficit components segregated into own sourced county revenue deficits, county development budget deficits and county recurrent deficits.

A study by Hussain, (2017),onthe impact of fiscal deficit and economic growth in Bangladesh, used time series data for the period 1993/1994- 2015/2016.The author considered GDP growth rate and fiscal deficits as study variables and used Fully Modified Ordinary Least Squares (FM-OLS) and VECM to estimate the model. The empirical findings revealed a significant positive effect of budget deficit on GDP growth, in support of Keynesian theory. Because the dynamics of the economy of Bangladesh differs from those of Kenya, the findings may not be generalized for Kenya. In addition, the study did not segregate budget deficits into different components.

Molefe, *et.al,* (2017) explored the consequences of budget deficit on economic growth of South Africa. The authors used real GDP, budget deficit, real interest rate, labor, gross fixed capital formation and unemployment. Annual time series data spanning 1985 to 2015 was considered and VECM utilized to estimate the long-run equation. The findings revealed a negative effect of budget deficit on economic growth, in support of the neoclassical hypothesis. Basing on these results, a conclusion was derived that high budget deficit level was detrimental to the economy of South Africa. The study findings cannot be used to generalize the effect of budget deficit components on economic growth of counties in Kenya. This is because it used national level data set and did not breakdown the budget deficit into different components. The present study was keen in addressing these gaps and informed use of budget deficit components and county level data set.

While using panel data, Arjomand, *et.al*, (2016) investigated the effects of budget deficit, labour productivity and economic growth in ten selected MENA countries. These were Egypt, Iran, United Arab Emirates, Jordan, Kuwait, Lebanon, Morocco, Oman, Syria and Tunisia. The authors used data collected from 2000 to 2013 and employed panel econometric technique of Estimated Generalized Least Squares(EGLS) method. The variables considered were government budget deficit, labor productivity, inflation and GDP. Results exhibited a negative effect of budget deficit on economic growth, which supported the neoclassical theory. The study did not consider budget deficit components, which this present study considered, in addition to narrowing it to the devolved level of governance.

In a study conducted by Ramu, *et.al,* (2016) to analyze the effect of fiscal deficit components on economic growth in India, time series data from 1980/81 to 2012/13 was considered. Real GDP at market price (GDP), tax revenue, gross fiscal deficit, own sourced revenue deficit, effective fiscal deficit (proxy for development budget deficit), private investment and exchange rate were the study variables. Fully Modified Ordinary Least Square (FM-OLS) and VECM approaches were used. The results revealed that development budget deficit had a positive effect on GDP, while own sourced revenue deficit had an adverse effect on GDP. This is supported by Moraa, (2013) and Karnik, (2002), who observed that own sourced revenue deficit had an adverse effect on growth of GDP in Kenya and India respectively. On the basis of these results, the study recommended for reduction of own sourced revenue deficit and utilization of deficits for capital expenditure rather than recurrent expenditure. Despite this study categorizing budget deficit into different components and considering data for both central and state governments, it did not bring out the effect of growth on budget deficit components at the state governments level. The study used time series data, but this present study used panel data set, which is characterized by more flexibility, less co linearity, larger degrees of freedom and has a higher efficiency.

While analyzing the impact of budget deficit on GDP growth for Bangladesh, Haider, *et.al,* (2016) used quarterly time series data for exchange rate, interest rate, inflation rate, employment, GDP and budget deficit, gathered for the period 2000 to 2012. The authors utilized VAR and VECM with their results indicating a negative effect of budget deficit on GDP, in line with the neoclassical school of thought. The study concentrated at the national dataset for Bangladesh with budget deficits not decomposed into different components. The present study considered data set at the devolved governance level and segregated budget deficits into own sourced county revenue deficit, development budget deficits and recurrent budget deficits.

Rana and Wahid, (2016) in their attempt to establish the impact of government budget deficit on economic growth of Bangladesh, conducted a time-series analysis of 31 annual observations, running from 1981 to 2011. The study variables were real GDP, total investment, budget deficit, real interest rate, real exchange rate and inflation rate. The researchers used Ordinary Least Squares (OLS) and VECM. Their results revealed a significant negative impact of budget deficit on economic growth in Bangladesh, effectively supporting the neoclassical proposition. Since Bangladesh did not have a devolved structure, the study only relied on the national level dataset. Its findings cannot be relied on in generalizing the effect of budget deficit on economic growth at the sub national level.

Conducting a study on the impact of fiscal deficit on economic growth in five countries in Southern Asia, Navaratnam and Mayandy, (2016) considered GDP as dependent variable and fiscal deficit as independent variable. The countries studied were Bangladesh, India, Nepal, Pakistan and Sri Lanka. These researchers used panel data over the period 1980 to 2014 and employed co integration analysis, ECM and Granger causality test under VAR framework. The results confirmed that fiscal deficit has a negative impact on growth in all countries, except in Nepal where deficit had a positive impact on growth. The negative impact of deficit on growth confirmed the neoclassical view. Despite the study using panel data, it considered national level data set for the five south Asian countries. This made it difficult to draw a conclusion on this effect at the sub national level.

In Pakistan Nayab, (2015) studied the effect of budget deficit on economic growth using time series data covering 1976 to 2007. The study considered GDP as dependent variable with labour, investment and fiscal deficit as independent variables.VAR and VECM were used with findings showing a negative relationship between budget deficit and economic growth, in support of the neoclassical paradigm. The study considered aggregate budget deficits and as such did not bring out the effect of budget deficit components on economic growth.

On their part, while considering different regimes, Edame and Okoi, (2015) examined the impact of fiscal deficits on Nigeria's economic growth during democratic and military regimes. Time series data was collected for the periods 1985 to 1998 (autocratic regime) and 1999 to 2013 (democratic regime). The study used GDP, fiscal deficit, interest rate and gross fixed capital formation as its variables. The Ordinary Least Squares (OLS) was used to examine the impact of fiscal deficits on growth before and after introduction of democracy in Nigeria in 1999. Analysis results showed a significant positive impact of fiscal deficit on economic growth during the dictatorial regime only. The study findings would have been used to generalize this effect in the Kenyan context, which has been under a democratic regime for long. However, it concentrated at the national level. The present study concentrated at the sub national level to bridge this gap.

Using annual time series data from 1930 to 2010, Hassan *et.al,* (2014) analyzed the effect of government deficit spending on GDP of the United States. Their study variables were GDP, deficit spending, unemployment rate, interest rate and inflation rate as study variables. The Ordinary Least Squares (OLS) technique and Johansen co integration were used. The findings indicated that deficit spending was negatively related with economic growth, supporting the neoclassical argument. The fact that the study did not consider segregating budget deficits, rendered its findings incapable of bringing out the effect of budget deficit components on economic growth of devolved governments. This study will be addressing this gap by considering county level data set comprising of own sourced county revenue deficit, county development budget deficit and county recurrent budget deficit.

Cinar, *et.al,* (2014) examined the role of budget deficit policies in economic growth from the viewpoint of Keynesians. The study was done in five best and five worst countries in the Euro zone according to their debt ratios, considering rates of economic growth, ratios of debt and budget deficit. The study utilized quarterly panel data running from 2001Q1 to 2011Q4 on the best 5 (Luxembourg, Ireland, Slovakia, Slovenia and Finland) and 5 worst countries (Austria, Belgium, Italy, Portugal and Greece) by their debt levels. A panel ARDL model was used and the results showed that in the long run, budget deficit policies had a neutral effect on economic growth for both category of countries. This supported the neoclassical school of thought. The study findings could not explain the effect of budget deficit on economic growth at the sub national level, as it relied solely on dataset at the national level.

In Kenya, Odhiambo, *et.al,* (2013) conducted a study on the effect of fiscal deficits on economic growth. They used annual time series data over the period 1970 to 2007. The study variables were GDP growth rate, investment-income ratio, budget deficit, labour force, private domestic investment, inflation rate, foreign exchange rate and a proxy for structural adjustment program. The authors used Ordinary Least Squares (OLS) technique and found that Kenya's budget deficit had a positive effect on economic growth. The study findings were only relevant at the national level, but not at the county level, where this present study aimed at by considered county level data set.

The study by Fatima, *et.al,* (2012) investigated the consequential effects of budget deficit on economic growth of Pakistan. The annual time series for the period 1978 to 2009 was collected for GDP, inflation, real exchange rate, real interest rate, budget deficit and gross investment. Their Ordinary Least Squares (OLS) regression results showed a significant negative effect of budget deficit on economic growth of Pakistan, as hypothesized by the neoclassical economists. The study, could not bring out the effect of budget deficit components on economic growth at the local level, since it concentrated on the national level data set, in addition to considering aggregate budget deficits

2.4 Summary of Literature Review

The reviewed studies reveal mixed empirical findings concerning the effect of budget deficits on economic growth. Biplob, (2019), Hussain (2017), Nayab, (2015), Edame and Okoi, (2015) and Odhiambo *et.al,*(2013), found positive effect, the studies by Tung (2018), Molefe*et.al* (2017), Ramu, *et.al,* (2016), Haider *et.al,* (2016), Rana and Wahid (2016), Navaratnam and Mayandy (2016), Hassan *et al*. (2014), and Fatima, *et.al*, (2012 found negative effect, while Cinar*et.al*, (2014) found no effect. These studies considered national level data set, with most of them not breaking budget deficits into different components. Only studies by Ramu, *et.al*, (2016), Moraa (2013), Rangarajan and Srivastava, (2005) and Karnik, (2002), partly explained how own sourced revenue deficits, development budget deficits and recurrent budget deficits affect growth. As such, a gap in literature exists at the sub national level concerning the effect of budget deficit components on economic growth of counties in Kenya. To bridge this gap, this study considered county level data set and broke down budget deficits into own sourced county revenue deficit, county development budget deficit and county recurrent budget deficit.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section highlighted the research design, study area, target population, sampling, data collection, model specification, measurement of variables, data analysis techniques and data presentation.

3.2 Research Design

Creswell (2008) defines a research design as the plan and procedures for a research process. It spans the decisions from broad assumptions to detailed methods of data collection and analysis, which generate answers to research problems. Kothari, (2004) also defines a research design as the arrangement of conditions for collection and analysis of data in a manner that combine research purpose with procedure. This study adopted a correlational research design. According to Simon, *et.al,* (2011), correlational research design is used to establish relationships between variables. If such a relationship exists, correlation is used to determine a regression model that makes predictions to a population. The study used a regression analysis, whose basic form is correlation analysis to measure the effect of independent variables on the dependent variable. It also allowed for measurement of the effect of control variables on the dependent variable, rather than holding them constant. Use of correlational research design was appropriate for this study which analyzed the effect of county budget deficits on Gross County Product in Kenya. This study used the Random Effects model to determine the effect of county budget deficits on Gross County Product in Kenya. The county budget deficits were segregated as own sourced county revenue deficit, county development budget deficit and county recurrent budget deficit.

3.3Study Area

The study was conducted in Kenya, considering all the 47 counties, as per the 2010 constitution. Kenya coversan area of 582,650 sq. km, is located in Eastern Africa with latitude of 1°00'N and a longitude of 38°00'E.After the oil crisis in 1970, the country has been facing budget deficits and dwindling rates of economic growth. In 2013, Kenya established 47 county governments. Between 2013 to 2017, the country registered GDP growth rate of 5.9%, 5.4%, 5.7%, 5.9% and 4.9%. During the same period, budget deficit as a percentage of GDP registered an increasing trend. It was 39.8 in 2013, 44.2 in 2014, 48.8 in 2015, 53.8 in 2016 and 57.1 in 2017. The KNBS, (2019) indicated that since 2013, each county had been posting an increasing trend in their contribution to national GDP, through Gross County Product (GCP). At the same time, counties registered increasing trend of budget deficits, COB reports, (2013-2017).

3.4Target Population

Burns, *et.al*, (2003) describe population as all the elements that meet the criteria for inclusion in a research study. The study considered all the 47 counties for a period of 5 years (2013-2017).

Table: 3.1List of Counties in Kenya

County Code	County Name	County Code	County Name	County Code	County Name
1.	Mombasa	17.	Makueni	33.	Narok
2.	Kwale	18.	Nyandarua	34.	Kajiado
3.	Kilifi	19.	Nyeri	35.	Kericho
4.	Tana River	20.	Kirinyaga	36.	Bomet
5.	Lamu	21.	Muranga	37.	Kakamega
6.	Taita Taveta	22.	Kiambu	38.	Vihiga
7.	Garissa	23.	Turkana	39.	Bungoma
8.	Wajir	24.	West Pokot	40.	Busia
9.	Mandera	25.	Samburu	41.	Siaya
10.	Marsabet	26.	Trans Nzoia	42.	Kisumu
11.	Isiolo	27.	Uasin Gishu	43.	Homa Bay
12.	Meru	28.	Elgeyo Marakwet	44.	Migori
13.	Tharaka Nithi	29.	Nandi	45.	Kisii
14.	Embu	30.	Baringo	46.	Nyamira
15.	Kitui	31.	Laikipia	47.	Nairobi
16.	Machakos	32.	Nakuru		

Source: Independent Electoral and Boundaries Commission (IEBC) 2013

3.5Sampling

Census sampling was applied in this study. Census sampling is a statistical investigation in which data is collected from all the elements of a population. All the data existing on counties GCP and County budget deficits were collected for all the 47 counties for a period of 5 years realizing 235 observations. Variables considered in the sampling were Gross County Product, county development expenditure (proxy for capital stock), county population, own sourced county revenue deficit, county development budget deficit and county recurrent budget deficit as the population for this study.

3.6Data Collection

Secondary panel data was collected for 47 Counties for the period 2013 to 2017. The data was sourced from the Annual County Governments Budget Implementation Reports by the Controller of Budget (COB) and the Gross County Product (2019) published by Kenya National Bureau of Statistics (KNBS).

3.7Model Specification

The study was based on the Solow-Swan neoclassical economic growth model. To analyze the effect of county budget deficits on Gross County Product in Kenya, the study's panel data analysis model (3.1) follows model (1.7), where GCP was the dependent variable and county budget deficit components were the independent variables while the error term took care of other components.

$$lnY_{it} = ß_0 + \alpha lnK_{it} + \psi lnL_{it} + \beta_1 lnD_{it} + \beta_2 lnLR_{it} + \beta_3 lnR_{it} + e_{it} \qquad (3.1)$$

Where,

ln is the natural log

Y_{it} denoted Gross County Product (GCP),

i = 1, 2, ... and represented the number of observations which were the 47 counties in Kenya

t = 1, 2, ...was the time period, which in this study was five years from 2013 to 2017.

K_{it} denoted capital stock, which was represented by county development expenditure

K_{it} denoted labor force, which was represented by the population within a county

D_{it} represented county development budget deficit (DBD)

LR_{it} represented down sourced county revenue deficit (LRD)

R_{it} represented county recurrent budget deficit (RBD)

$ß_0$- Constant

$\beta_1, \beta_2, \beta_3$ were the coefficients

e_{it} was the error term, assumed to be independent for all individual observations at all time periods and was distributed normally with zero mean and a constant variance.

3.8Measurement of Variables

The study variables were measured as follows;

Gross County Product: According to KNBS, (2019) Gross County Product (GCP) is a geographic breakdown of Kenya's Gross Domestic Product (GDP), which gives an estimate of the size and structure of county economies. It also provides a benchmark for evaluating the growth of county economies over time. The GCP estimates are consistent with the published national GDP in the sense that the sum of the GCP is equal to national-level GDP. However, it was not possible to distribute taxes (less subsidies) on products due to lack of sufficient details.

In this study, GCP was measured in millions of Kenya shillings at current prices since this data was available in current prices.

Own sourced county revenue deficit: This was the difference between projected own sourced revenue and actual own sourced revenue received by each county government from own internal sources. This deficit was measured in millions of Kenya shillings.

County development budget deficit: The difference between approved allocation and actual receipts by each county government for development expenditure. It was measured in millions of Kenya shillings.

County recurrent budget deficit: The difference between approved allocation and actual receipts by each county government for recurrent expenditure. It was measured in millions of Kenya shillings.

County population: This was the projected total number of persons within each county for each of the years under study. It was used as a proxy for labor force.

County development expenditure: This was the actual development expenditure incurrent by each county government in millions of Kenya shillings.

3.9Data Analysis

Use of descriptive and inferential statistics was employed. Oso and Onen, (2009) underscores that such statistics provide a powerful way of drawing conclusions about relationships or differences found in research results.

3.9.1 Panel Unit Root Test

Maddala and Wu, (1999) observed that it was essential to check stationary of data to avoid spurious regression, which leads to misleading inferences and conclusions. Using panel data unit root tests was accepted as one way of increasing the power of unit root tests. In this research, Fisher type test was used. According to Baltagi, (2005), the Fisher type test does not require a balanced panel, making it advantageous over other unit root tests. Choi, (2001) stated that this test combines p-values from panel specific unit root tests and uses four methods. The study considered inverse normal Z statistic, which Choi, (2001) argued to have the best trade-off between power and size. He further observed that inverse normal can be used whether the sample size if finite or infinite and as such recommended it for applications.

The null hypothesis of Fisher- type test is that all panels contain unit roots, against the alternative hypothesis that at least one panel is stationary. Under the null hypothesis, the Z test statistic has a standard normal distribution. Fisher -type test is given under equation (3.2) below.

$$Z = \frac{1}{\sqrt{N}} \sum_{n=1}^{N} \phi^{-1 (pi)} \qquad (3.2)$$

Where $\phi^{-1 (pi)}$ is the inverse of the standard normal distribution.

3.9.2Correlation Analysis

According to Oso and Onen (2009) correlation is used in a research process to establish the magnitude and direction of association between two or more variables. The analysis was based on the null hypotheses of no association between each of the budget deficit components and Gross County Product in Kenya.

3.10 Panel Analysis

Baltagi, (2005) and Maddala, (1987) argues that panel data approach provides efficient and unbiased estimators. In addition, it provides a larger number of degrees of freedom, which allow researchers to overcome problems with small samples. These problems are associated with the estimation of the linear regression model, especially due to the time-dimension of the data. Spilioti, (2015) added that panel data models allow researchers to analyze a number of important economic questions that cannot be addressed using sets of cross-sectional or time-series data alone. Arjomand, *et.al,* (2016) also noted that panel data method was characterized by high capability in identifying and measuring the effects which are not easily predicted in cross-section and particular time series studies. Panel analysis was based on random effect and fixed effect models, with appropriate model determined by Hausman test.

3.11 Diagnostic Tests

In this research, diagnostic tests were conducted to determine if study variables satisfied the assumptions of the regression analysis. These tests determined the distribution of random variable, relationship between error terms, the relationship between explanatory variables themselves and the constant variance of the residuals. Specific tests included the Hausman test, multi co linearity test, autocorrelation test, heteroscedasticity test and normality test. Each of these tests were highlighted below.

3.11.1 Hausman Specification Test

This study utilized test developed by Hausman, (1978) to select between Fixed Effects model and Random Effects model. According to Hausman, (1978), the Fixed Effects model controls for all time-invariant differences between the variables. As such the estimated coefficient of the Fixed Effects models cannot be biased because of invariant characteristic. Random Effects give better p-value, since they are more efficient. The Hausman test, was therefore useful in identifying the most efficient estimator that give consistent results. In the Hausman test, the null hypothesis suggests that Random Effects model should be preferred, with the alternative hypothesis preferring Fixed Effects model.

Table: 3.2Hausman Specification Test Results

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B)
	Fixed Effect	Random Effect	Difference	S.E
LNGCP_L1	0.0155752	0.0828113	0.0983865	0.020918
LNLRD	-0.0573946	-0.4453892	-0.3879946	0.2254501
LNLRD_L1	-1.101585	-1.026672	-0.0749133	0.1897163
LNDBD	0.0541718	0.2143817	0.1602099	0.0628195
LNDBD_L1	0.0896839	0.0623029	0.0273811	0.1517045
LNRBD	-1.012593	-0.1296037	-1.142197	.
LNRBD_L4	-0.3754145	-0.0682958	-0.4437103	0.122332
LNPOP	0.0129376	0.0055082	0.0074295	0.0034366
LNPOP_L2	0.0043551	0.0001515	0.0045067	0.0032946
LNGDE	0.9572931	0.8019373	0.1553558	0.1453393
LNGDE_L4	1.763347	1.374379	-0.388968	0.1401861

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 5.20 Prob>chi2 = 0.9209
(V_b-V_B is not positive definite)

Source: Author

The Hausman test results were displayed in Table 3.2, with reported chi square statistic of 5.20 at 9 degrees of freedom, with a probability value being 0.9209. The null hypothesis was that Random Effect was the best model, while the alternative hypothesis was that Fixed Effect was the best model. Since the value of probability (0.9209) was greater than 0.05, the null hypothesis could not be rejected at 5 percent level of significance. The Random Effect model was chosen as the most consistent model.

3.11.2 Multicollinearity Test

Gujarati, (2004) state that multicollinearity arises when there is a perfect linear relationship among some or all of the independent variables in a regression model. Multicollinearity makes it difficult to determine the effect of individual regressors on the dependent variable. In this research, the Variance Inflation Factor (VIF)was used to detect multicollinearity. The null hypothesis was no multicollinearity, against the alternative hypothesis of multicollinearity.

According to Gujarati, (2004), when VIF exceeds 10, as a rule of thumb, such a variable is said to be highly collinear. The VIF in this research was given by

$$VIF = \frac{1}{1 - r^2 x_{it}} \qquad (3.3)$$

Where $r^2 x_{it}$ was the coefficient of correlation between explanatory variables, Xi.

Table: 3.3Variance Inflation Factors Results

Variable	VIF	1/VIF
LNGCP_L1	1.86	0.537607
LNLRD	2.61	0.382479
LNLRD_L1	2.02	0.494628
LNDBD	1.20	0.834484
LNDBD_L1	1.23	0.813970
LNRBD	2.17	0.460581
LNRBD_L4	1.04	0.959552
LNPOP	1.41	0.711612
LNPOP_L2	1.14	0.879055
LNGDE	1.07	0.932819
LNGDE_L4	1.03	0.969858
Mean VIF	**1.53**	

Source: Author

The VIF test results for the regression variables were displayed in Table 3.3. These results show a mean VIF of 1.53, which was far below 10, hence the null hypothesis of no multicollinearity could not be rejected. As such, the regression variables did not suffer from multicollinearity.

3.11.3 Autocorrelation Test

Kurt, *et.al*,(2012) appreciates that autocorrelation (serial correlations) is a major problem, in both time series and panel data analysis. According to him, one of the basic assumptions of regression analysis is that the error terms for different observations are not correlated. However, autocorrelation or serial correlation exists if error terms are associated with each other. Wooldridge test for autocorrelation in panel data was used in this study. The null hypothesis of this test assumes absence of autocorrelation, while the alternative hypothesis assumes presence of autocorrelation of panel data.

Table: 3.4Wooldridge Test for Autocorrelation in Panel Data

H0: no first order autocorrelation	
F (1, 45) = 0.511	Prob > F = 0.4784

Source: Author

Results in Table 3.4 reported F statistic of 0.511, with a probability value of 0.4784. Since this probability was greater than 0.05, the null hypothesis of no first order autocorrelation could not be rejected at 5% level of significance. This was an indication that residuals did not suffer from first order autocorrelation.

3.11.4 Heteroscedasticity Test

Heteroscedasticity sets in when the variance of residuals is unequal over a range of measured variables and results to unequal scatter of the error term. Kurt, *et.al*, (2012) states that in panel data analysis, homoscedasticity is one of the basic assumptions that must be tested. Breusch-Pagan test for heteroscedasticity was employed, as it is one of the most popular tests for heteroscedasticity. The null hypothesis of this test is that residuals are homoscedastic, against the alternative hypothesis that residuals are heteroscedastic.

Table: 3.5Breusch-Pagan / Cook-Weisberg test for Heteroskedasticity

Ho: Constant variance	
Variables: Residuals	
chi2(1) = 0.73	Prob > chi2 = 0.3918

Source: Author

The test results in Table 3.5 indicated a chi square test statistic of 0.73 at one degree of freedom, with a probability value of 0.3918. The probability value being greater than 0.05, meant that at 5% level of significance, the null hypothesis could not be rejected. The findings proved absence of heteroscedasticity among residuals.

3.11.5 Residual Normality Test

The study used Shapiro-Wilk test for testing normality of the error term. Razali and Wah, (2011), argue that among all the tests for normality, the Shapiro-Wilk test has the highest power. The null hypothesis of this test is that residuals are normally distributed. This is important, as error term is usually assumed to be normally distributed.

Table: 3.6Results for Shapiro Wilk test for Normality

Variable	Obs	W	V	z	Prob>z
Residuals	231	0.98495	2.547	2.167	0.15103

Source: Author

The results in Table 3.6 with a probability value of 0.15103> 0.05 implied that the null hypothesis of residuals being normally distributed could not be rejected at 5% level of significance. This implied that residuals were normally distributed.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Introduction

This chapter presents and discusses analysis of results which covers a summary of descriptive statistics, correlation analysis, panel unit root test and panel analysis of Random Effects model and Fixed Effects model as presented in sections 4.2 to 4.6.

4.2. Descriptive Statistics

The analysis considered annual panel data set covering a period of five years from 2013 to 2017, for each of the 47 counties in Kenya. As such, 235 observations were made for each study variable, as presented in Table 4.1.

Table 4.1: Descriptive Statistics

	GCP	LRD	DBD	RBD	POP	GDE
Mean	123,974.8	-431.7720	-1,117.589	-377.0087	0.990383	1,712.136
Median	85,101.00	-163.5600	-795.2500	-155.6600	0.960000	1,507.060
Maximum	1,492,323.00	50.71000	771.3100	3,657.190	4.230000	6,432.920
Minimum	10,237.00	-8636.170	-11,230.05	-8,567.900	0.110000	32.24000
Std. Dev.	184,225.1	945.7970	1,272.851	1,052.764	0.631901	1,163.866
Skewness	5.239431	-5.469231	-3.957338	-5.093597	2.224963	1.441082
Kurtosis	33.83869	39.81506	25.28225	37.03074	11.13082	5.679196
Jarque-Bera	10,387.30	14,442.69	5,474.921	12,355.81	841.2229	151.6235
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	29,134,072	-1,014,66.4	-262,633.4	-88,597.03	232.7400	402,352.1
Sum Sq. Dev.	7,940,000,000,000	209,000,000	379,000,000	259,000,000	93.43607	317,000,000
Observations	235	235	235	235	235	235

Source: Author

Table 4.1 gives the descriptive statistics for each of the study variables in millions of Kenya Shillings. The GCP, LRD, DBD, RBD, POP and GDE are the Gross County Product, own sourced county revenue deficit, county development budget deficit, county recurrent budget deficit, county population and county development expenditure respectively for each of the 47 counties in Kenya.

Gross County Product had a mean value of123,974.8, a maximum of 1,494,323and a minimum of10,237. This means that on average Gross County Product for each county in

Kenya was KES123,974.8millionover the last five years. Since Gross County Product measures the level of economic growth for each county, the higher its value, the better the welfare of residents of that county. As indicated by KNBS, (2019) over the past five years, Nairobi City County recorded the highest Gross County Product, ofKES1,492,323million, while Isiolo County reported the lowest Gross County Product which wasKES10,237million.

The mean own sourced county revenue deficit was -431.77, with a maximum of 50.71 and a minimum of -8,636.17. This means that for each county in Kenya, the average own sourced county revenue deficit for the past five years was KES. -431.77 million. The maximum own sourced county revenue deficit was 50.71 and a minimum of-8,636.17. This means that over the past five years, the county with the highest own sourced county revenue deficit reported KES50.71million, while the county with the lowest deficit reported KES-8,636.17 million. As reported by COB, (2013, 2014, 2015, 2016 and 2017), Nairobi City County had the highest own sourced county revenue deficit (lowest surplus) of KES -8,636.17 million, while Marsabit County had the highest surplus (lowest deficit) of KES 50.71 million.

County development budget deficit had a mean value of -1,117.59. This implies that on yearly basis, the county development budget deficit for each county in Kenya was KES -1,117.59 million over the past five years. The county development budget deficit indicated a maximum value of 771.31and a minimum value of -11,230.05. This implied that for the past five years, the highest county development budget deficit recorded in counties was KES771.31 million, while the lowest was KES-11,230.05 million. As shown by COB reports, Tharaka Nithi County had the highest surplus (lowest deficit) of KES 771.31 million, while Nairobi City County registered the lowest surplus (highest deficit) of KES -11.230.05 million.

County recurrent budget deficit with a mean value of -377.0087 implies that over the past five years, counties in Kenya had an average of KES-377.0087 million as their recurrent budget deficits. The maximum county recurrent budget deficit was 3,657.19, while the lowest was -8,567.90. These imply that for the past five years, the highest county recurrent budget deficit to be reported by counties in Kenya was KES3,657.19 million, while the lowest was KES-8,567.90 million over the same period. The Controller of Budget Reports over the same period show that Nakuru County had the highest surplus of KES 3,657.19 million and Nairobi City County reported the lowest surplus (highest deficit) of KES -8,567.9 million.

The mean county population was 0.99, with a maximum value of 4.23 and a minimum value of 0.11. These results imply that for the past five years, counties registered an average population of 0.99 million. The highest population reported in counties over the same time span was 4.23 million, while the lowest was 0.11 million. Nairobi City County had the highest population of 4.23 million people, as Lamu County had the lowest population of 0.11 million people.

The mean county development expenditure was 1,712.136, which implies that over the past five year, each county spent an average of KES 1,712.14 million on development spending. The maximum county development expenditure was 6,432.92 with the minimum being 32.24. These results show that the highest county development spending to be undertaken by the counties was KES6,432.92 million, while the lowest was KES 32.24 million. Turkana County had the highest county development spending of KES 6,432.92 while Tana River County reported the lowest development expenditure at KES 32.24 million.

The standard deviations for county population and county development expenditure were less than their means. The implication is that these variables were close to their means and this also suggests absence of outliers. The standard deviations for Gross County Product, own sourced county revenue deficit, county development budget deficit and county recurrent budget deficit were all higher than their means. This implies presence of outliers and also suggests that these variables were not normally distributed. This was further confirmed by the Jarque Bera test statistic, whose probability value for each of these variables was less than 0.05, implying that at 5 percent level of significance, all these variables were not normally distributed. These findings support log transformation of all the study variables. The data used in the study was then log transformed to smoothen them by stabilizing their variances. Gross County Product, county population and county development expenditure variables each had a positive skewness. This implies that each of these variables had a right tail. Own sourced county revenue deficit, county development budget deficit and county recurrent budget deficit each had a negative skewness, which means that these variables were left tailed. The kurtosis for each of the variables were positive, an indication that each of the variables had a relatively peaked distribution.

4.3 Correlation Analysis

The study used the coefficient of correlation (r) to identify existence or absence of a linear association between each of the explanatory variables and Gross County Product as in Table 4.2. From the results it can also be noted that the pair wise correlations between all the budget deficits and GCP were less than 0.8 which indicates that multicollinearity was not a problem.

Table 4.2: Panel Correlation Analysis

	GCP	LRD	DBD	RBD	POP	GDE
LNGCP	1.0000					
LNLRD	-0.4629 *** (0.0000)	1.0000				
LNDBD	0.4691 *** (0.0000)	0.4131 *** (0.0000)	1.0000			
LNRBD	-0.3062 *** (0.0000)	- 0.2921 *** (0.0000)	0.3309 *** (0.0000)	1.0000		
LNPOP	0.6744 *** (0.0000)	0.4006 *** (0.0000)	0.4968*** (0.0000)	0.2794*** (0.0000)	1.0000	
LNGDE	0.2331 *** (0.0003)	0.1021 (0.1185)	0.2183*** (0.0008)	0.0204 (0.7552)	0.4426*** (0.0000)	1.0000

Source: Author

*Values in parentheses ( ) are p-values with ***, indicating association of the variables at 5% level of significance.*

In terms of the association between own sourced county revenue deficit and Gross County Product, the results in Table 4.2 based on the correlation coefficient (-0.4629)with a probability value (0.0000). The probability value being less than 0.05 showed existence of a significant negative association between own sourced county revenue deficit and Gross County Product. The results implied a rejection of the null hypothesis of no significant association between own sourced county revenue deficit and Gross County Product, at 5 percent level of significance. This association was expected based on the a priori expectation and was further consistent with findings by Ramu, *et.al*,(2016), Rangarajan and Srivastava, (2005) and Karnik, (2002). As own sourced county revenue deficit increases, Gross County Product decreases and vice versa.

Concerning the association between county development budget deficit and Gross County Product, the results in Table 4.2 highlighted the correlation coefficient (0.4691)with a probability value (0.000). This probability value being less than 0.05implied a significant positive association between county development budget deficit and Gross County Product. This means that as county development budget deficit increases, Gross County Product decreases. The results led to the rejection of null hypothesis of no significant association between county development budget deficit and Gross County Product at 5 percent level of significance. The result was expected and was further consistent with findings by Ramu, *et.al*, (2016), who conducted their study in India.

With reference to the association between county recurrent budget deficit and Gross County Product, Table 4.2 reported the correlation coefficient (-0.3062)with a probability value (0.0000). With probability value less than 0.05 implies a significant negative association between county recurrent budget deficit and Gross County Product. This means that as county recurrent budget deficit increases, Gross County Product reduces and vice versa. As such, the null hypothesis of no significant association between county recurrent budget deficit and Gross County Product was rejected at 5 percent level of significance. The findings were consistent with the a priori expectation and results by Gupta, *et.al,* (2005) and Ramu, *et.al,* (2016) who argued that deficits spent on recurrent ventures were detrimental to the economy.

For the association between county population and Gross County Product, correlation coefficient was 0.6744 with a probability value 0.0000 < 0.05. The findings showed a significant positive association between county population and Gross County Product. This implies that as county population increases, Gross County Product also increases. Based on these results, the null hypothesis of no significant association between county population and Gross County Product was rejected at 5 percent level of significance. These findings conform to the a priori expectation and was also consistent with findings by Odhiambo, *et.al*,(2013).

The association between county development expenditure and Gross County Product reported a pair wise correlation coefficient of 0.2331, with a probability value of 0.0003, less than 0.05. The results showed a significant positive association between county development expenditure and Gross County Product. This means that as county development spending increases, Gross County Product increases. The null hypothesis of no significant association between county development expenditure and Gross County Product was rejected at 5 percent level of significance. The findings were expected and was in supported of findings by Molefe, *et.al,* (2017), Edame and Okoi, (2015), and Gupta, *et.al,* (2005).

4.4. Unit Root Test

This empirical research began by examining the stationary properties of the data. Fisher type test for stationarity was used to conduct unit root test. The null hypothesis for this test is that all panels contain unit root, against the alternative hypothesis that at least one panel is stationary. The test uses four methods, proposed by Choi, (2001), who further recommends use of inverse normal (Z) statistic. Choi (2001) argues that the Z statistic provides the best trade-off between size and power, among the other three Fisher-type test statistics. In addition, he argues that both inverse-normal and inverse-logit transformations can be used whether the sample size is finite or infinite. Under the null hypothesis, Z has a standard normal distribution and its low value means the null hypothesis is doubted. The unit root test results were displayed in Table 4.3.

Table 4.3: Panel Unit Root Test Results

Variable	Test in	Fisher ADF test Z statistic	Conclusion
LNGCP	Level	-15.8466(0.0000) ***	I (0)
LNLRD	Level	-13.2600(0.0000) ***	I (0)
LNDBD	Level	-1.7292(0.0419) ***	I (0)
LNRBD	Level	-6.3523(0.0000) ***	I (0)
LNPOP	Level	-7.8873(0.0000) ***	I (0)
LNGDE	Level	4.9037 (1.0000)	
	First difference	-9.0815(0.0000) ***	I (1)

Source: Author

*Note. ADF is the Augmented Dickey Fuller, values in parentheses ( ) are p-values while *** indicate stationarity of the variables at5% level of significance respectively*.

The test results in Table 4.3 revealed that Gross County Product, own sourced county revenue deficit, county development budget deficit, county recurrent budget deficit and county population were stationary at level, an indication of integration of order zero. This was expected and may be a pointer to the effectiveness of policies put in place by the various County governments. County development expenditure was stationary after first differencing, an indication that the variable was integrated of order one. The existence of unit root in this variable was expected since county development expenditure always grow and therefore has trend.

These results supported the choice of autoregressive distributed lag (ARDL) model, developed by Pesaran*et.al*, (1999), as an estimation method for this study. Cinar, *et.al* (2014) argue that ARDL model is useful when series have different co integration levels, mainly I (0) and I (1), but not I (2). According to Olubiyi, *et.al*, (2018), ARDL is a standard least squares regression, which include lags of both the dependent variable and explanatory variables as regressors. Cinar, *et.al* (2014), argue that ARDL involves the use of a single-equation set-up, is simple to implement and interpret, making it better than the co integration analyses developed by Engle and Granger (1988) and Johansen (1995). Pesaran, *et.al*, (1999), also note that ARDL is a reliable model in both big and small samples.

4.5 Panel ARDL Lag Determination

The study ran separate regressions to obtain lag length for each study variable. The Akaike Information Criterion (AIC) was used to select the lags for study variables. According to Raza *et.al*, (2015) this is the mostly used information criterion in panel estimation. This is because AIC minimizes the chance of underestimation, while maximizes the chance of recovering true lag length. The results are presented in Table 4.4

Table 4.4: Selected Lags for Study Variables

No	Name of Variable	Selected Lags	AIC
1.	Gross County Product (GCP)	1	1.322257
2.	Own sourced county revenue deficit (LRD)	1	-1.769081
3.	County development budget deficit (DBD)	1	0.599372
4.	County recurrent budget deficit (RBD)	4	-1.667454
5.	County population (POP)	2	5.279382
6.	County development expenditure (GDE)	4	-2.539842

Source: Author

4.6. Autoregressive Distributed Lag Models

4.6.1. ARDL Random Effects Model Results

The results for Radom Effects Model are displayed in Table 4.5. These results are discussed under each objective.

Table 4.5: ARDL Random Effect Model Results

Random effects GLS regression			Number of obs = 231			
Group variable: ID			Number of groups = 47			
R-sq: within = 0.0731			Obs per group: min = 1			
between = 0.8716			avg = 4.9			
overall = 0.7060			max = 5			
			Wald chi2(11) = 287.31			
corr(u_i, X) = 0 (assumed)			Prob > chi2 = 0.0000			
LNGCP	Coef.	Std. Err.	Z	P>z	[95% Conf.	Interval]
LNGCP_L1	0.0828113	0.0484657	9.43	0.000	0.361881	0.551863
LNLRD	-0.4453892	0.6488183	-2.48	0.013	-2.882841	-0.3395206
LNLRD_L1	-1.026672	0.5369633	-2.98	0.003	-2.651212	-0.5463545
LNDBD	0.2143817	0.162452	1.91	0.056	-.0076736	0.6291263
LNDBD_L1	0.0623029	0.2408685	3.38	0.001	.3417551	1.285942
LNRBD	-0.1296037	0.3365824	-2.30	0.022	-1.433076	-0.1136969
LNRBD_L4	-0.0682958	0.5500674	-1.60	0.110	-1.958116	0.1981081
LNPOP	0.0055082	0.0076256	2.27	0.023	0.0023776	0.0322693
LNPOP_L2	0.0001515	0.0075864	1.25	0.210	-0.0053491	0.024389
LNGDE	0.8019373	0.337429	4.38	0.000	0.815125	2.137822
LNGDE_L4	1.374379	0.3349669	-4.45	0.000	-2.146534	-0.8334874
_cons	100.1561	18.86813	5.31	0.000	63.17528	137.137
sigma_ u	0.13133191					
sigma_ e	0.25204242					
Rho	0.21353637 (fraction of variance due to u_i)					

Source: Author

4.6.1.1. Effect of Own Sourced County Revenue Deficit on Gross County Product

The first objective of this study was to determine the effect of own sourced county revenue deficit on Gross County Product of counties in Kenya. This was based on the null hypothesis that there was no effect of own sourced county revenue deficit on Gross County Product of counties in Kenya.

Random Effects results in Table 4.5 showed that lagged Gross County Product had a positive coefficient (0.08) and a probability value (0.000). The significant positive effect means that growth of Gross County Product in the previous year, will translate to higher growth of Gross County Product in the current year. Thus,1% growth rate in GCP of the past one- year increases growth rate of current GCP by 0.08%. The finding supports the empirical work by

Odhiambo, *et.al*, (2013), who found that past economic growth positively influenced the future growth.

Own sourced county revenue deficit had a negative coefficient (-0.45), with a probability value (0.013).The statistically significant effect implies that growth in the rate of present level of own sourced county revenue deficit reduces growth rate of the present Gross County Product. An increase in current own sourced county revenue deficit by 1% reduces growth rate of Gross County Product in the current year by 0.45% and vice versa. Growth in own sourced county revenue deficit is attributed to low own sourced revenue collection by counties which reduces budgetary allocation channeled to development projects that contribute to growth. The negative effect conforms to the a priori expectation and was consistent with findings by Ramu, *et.al*,(2016) and Karnik, (2002), who found a statistically significant negative effect in India.

Lagged own sourced county revenue deficit had a negative coefficient (-1.03), with a probability value of (0.003). This finding reveals a significant negative effect which implies that higher growth rate of own sourced county revenue deficit in the previous year reduces growth rate of Gross County Product in the current year. As such, when own sourced county revenue deficit grows by 1% in the past year, the growth rate of Gross County Product in the present year drops by 1.03% and vice versa.

4.6.1.2. Effect of County Development Budget Deficit on Gross County Product

The second objective of the study was to establish the effect of development budget deficit on Gross County Product of counties in Kenya. This was based on the null hypothesis that there was no effect of county development budget deficit on Gross County Product of counties in Kenya. The Random Effect results in Table 4.5 reveal that county development budget deficit had a positive coefficient (0.21) and a probability value (0.056).

Lagged county development budget deficit had a positive coefficient (0.06), with a probability value (0.001). This significant positive effect means that past growth in the rate of development budget deficit increases growth rate of Gross County Product in the current year. When the rate of county development budget deficit in the past increases by 1% there will be an increased growth rate of Gross County Product by 0.06% in the current year. The positive effect conforms to the a priori expectation, since past deficit spending in development projects helps in creating capital stock, which is vital for driving future economic growth. The findings were further consistent with those by Ramu, *et.al*,(2016) and Karnik, (2002), who found a statistically significant positive effect in India.

4.6.1.3.Effect of County Recurrent Budget Deficit on Gross County Product

The third objective of the study was to examine the effect of county recurrent budget deficit on Gross County Product for counties in Kenya. The analysis under this objective was based on the null hypothesis that there was no effect of county recurrent budget deficit on Gross County Product of counties in Kenya. Results of the Random Effects model in Table 4.5 reveal that county recurrent budget deficit had a negative coefficient (-0.13), with a probability value (0.022). The significant negative effect means that growth in the rate of present level of county recurrent budget deficit was detrimental to the economies of counties in Kenya. This is because when growth rate in county recurrent budget deficit increases by 1% in the current year, the rate of growth of Gross County Product declines by 0.13% and vice versa. The growth in county recurrent budget deficit implies growth in deficit spending on recurrent activities, which reduces resources that would have been invested in productive ventures that increase economic growth. This negative effect conforms to the economic a priori and further supports findings by Hussain, (2017), Navaratnam and Mayandy, (2016), Eli, (2010) and Bose, *et.al*,(2007).

Lagged county recurrent budget deficit had a negative coefficient (-0.07), with a probability value (0.110).

The county population with a positive coefficient (0.01) and a probability value (0.023), reveal that an increase in growth rate of present level county population was beneficial to the county economies. As shown by these results, when rate of county population grows by 1% in the current year, the growth rate of Gross County Product increases by 0.01% in the present period. The growth in county population implies an increase in labor force, which is critical in contributing to the economic growth. The result was expected and was further consistent with findings by Arjomand, *et.al*,(2016). However, the results differed with findings by Odhiambo, *et.al* (2013), who found that current population had a significant negative relationship with economic growth in Kenya.

Lagged county population had a positive coefficient (0.0002), with a probability value (0.210), shows a statistically insignificant positive relationship with Gross County Product at 5% level of significance.

County development expenditure had a positive coefficient (0.80) and a probability value (0.000). The implication is that increased growth rate in present level of county development expenditure drives growth rate of economies of counties in Kenya. As the result shows, an increased growth rate of county development expenditure in counties by 1% pushes present growth rate of Gross County Product by 0.80%. This was consistent with the economic a priori expectation and supports findings by Adam, C.S, and Bevan, D.L, (2005).

Lagged county development expenditure had a positive coefficient (1.37) and a probability value (0.000). These results indicate that when growth rate of county development expenditure in the past increases, the growth rate of Gross County Product in the present year also increases. The positive relationship conforms to the a priori expectation.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter presents a summary of the findings on the effect of county budget deficits on Gross County Product in Kenya, the conclusions and recommendations for both policy and areas for further research.

5.2 Summary

The purpose of this study was to analyze the effect of county budget deficits on Gross County Product in Kenya. This was premised on the three specific objectives, explained under 5.2.1, 5.2.2and 5.2.3 as follows.

5.2.1.Effect of Own Sourced County Revenue Deficit on Gross County Product

Findings on this objective revealed that at 5 percent level of significance, an increase in growth rate of past own sourced county revenue deficit had a negative effect on growth rate of Gross County Product. On the other hand, at 5 percent level of significance, growth in the rate of present year own sourced county revenue deficit reduces growth rate of present year Gross County Product.

5.2.2.Effect of County Development Budget Deficit on Gross County Product

Under this objective, the findings were that at 5 percent level of significance, an increase in growth rate of present year county development budget deficit had no effect on growth rate of Gross County Product. However, at 5 percent level of significance, an increase in growth rate of past year county development budget deficit had a positive effect on growth rate of Gross County Product.

5.2.3. Effect of County Recurrent Budget Deficit on Gross County Product

Finally, for this objective, at 5 percent level of significance, the findings revealed that an increase in growth rate of present year county recurrent budget deficit had a negative effect on growth rate of Gross County Product. However, at the 5 percent level of significance, growth in the rate of past county recurrent budget deficit had no effect on growth rate of Gross County Product.

5.3 Conclusion

The first null hypothesis of this study was that own sourced county revenue deficit had no effect on Gross County Product. Since the results did not support the null hypothesis, the study concluded that own sourced county revenue deficit had a negative effect on Gross County Product in Kenya.

The study's second hypothesis was that county development budget deficit had no effect on Gross County Product. Given that results did not support the study null hypothesis, it concluded that there was sufficient evidence that past growth in county development budget deficit had a positive effect on growth of Gross County Product in Kenya.

The third hypothesis of this study was that county recurrent budget deficit had no effect on Gross County Product. As the results did not support the null hypothesis, the study concluded that an increase in growth rate of present level county recurrent budget deficit had a negative effect on growth rate of Gross County Product in Kenya.

5.4 Recommendations

Given the conclusion that county development budget deficit had a positive effect on Gross County Product, while own sourced county revenue deficit and county recurrent budget deficit had a negative effect on Gross County Product, the following recommendations were proposed to enable county governments achieve their mandate. First, the county governments need to formulate policies that may help diversify their own sourced revenue base, reduce pilferage and build capacity to strengthen own sourced revenue collection systems. This will reduce own sourced county revenue deficits by increasing revenue collections which supports developmental projects and encourage growth at the county level. Secondly, the county governments need to formulate policies that enhance their development spending, close possible gaps that may cause loss of resources earmarked for development projects and ensure high absorption of development budgets. This will help in making deficit spending to have a bigger impact in improving economic growth at the county level. Finally, the county governments need to formulate and implement policies that discourage deficit spending on recurrent ventures and reduce pilferage on recurrent spending so as to have resources for productive spending. This will help in reducing deficit spending on recurrent activities and availing more resources for productive ventures, which is beneficial for economic growth at the county level.

5.5 Limitations of the Study

The main limitation of this study was that it covered a shorter time span. This is because the available data was from 2013, when the county governments in Kenya began their operations. Another shortcoming is the use of projected county population. Population data is availed every ten years and only projected population was available.

5.6 Recommendations for Further Research

This study recommended possible areas for future studies. One such area would be to consider the effect of budget deficit components on economic growth in other countries, economic blocs, regions and continents. Finally, future studies could also consider the same topic in Kenya but use data over a longer time period.

5.7 Contribution to Research

The study findings will be useful for academic consumption by adding literature to the ongoing debate concerning budget deficits and economic growth. Contribution to the body of knowledge will mainly be through use of county government data set, with budget deficits segregated into own sourced county revenue deficit, county development budget deficit and county recurrent budget deficit.

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APPENDICES

Appendix 1: ARDL Fixed Effects Model Results

Fixed- effects (within) regression	Number of obs = 231
Group variable: ID	Number of groups = 47
R-sq: within = 0.2279	Obs per group: min = 1
between = 0.1766	avg = 4.9
overall = 0.1193	max = 5
	F (11,173) = 4.64
corr(u_i, Xb) = 0.1364	Prob > F = 0.0000

LNGCP	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
LNGCP_L1	0.0155752	0.0490945	0.01	0.996	-0.0966516	0.0971512
LNLRD	-0.0573946	0.6045446	1.67	0.096	-0.1821086	2.204357
LNLRD_L1	-1.101585	0.4607918	0.23	0.820	-0.8043735	1.014622
LNDBD	0.0541718	0.1414932	-2.03	0.044	-0.5663077	-0.0077574
LNDBD_L1	0.0896839	0.2223775	0.47	0.639	-0.3343116	0.5435332
LNRBD	-1.012593	0.4221794	-0.46	0.646	-1.027804	0.6387676
LNRBD_L4	-0.3754145	0.4359104	-2.52	0.013	-1.956928	-0.2361534
LNPOP	0.0129376	0.0060073	0.81	0.421	-0.0070125	0.0167014
LNPOP_L2	0.0043551	0.0060127	2.03	0.044	0.0003431	0.0240784
LNGDE	0.9572931	0.310542	2.71	0.007	0.2298393	1.455717
LNGDE_L4	1.763347	0.29105	-5.02	0.000	-2.036872	-0.8879402
_cons	47.69245	17.23052	2.77	0.006	13.68333	81.70156
sigma_u	0.67437089					
sigma_e	0.25204242					
rho	0.87743546 (fraction of variance due to u i)					
F test that all u_i =0:	F (46, 173) = 8.36		Prob > F = 0.0000			

Appendix 2: Log Transformed Data

County ID	Year	LNGCP	LNRBD	LNDBD	LNLRD	LNPOP	LNGDE
1	2013	26.05197	21.29937	22.2271	21.93478	13.86731	18.49653
1	2014	26.20257	20.96112	21.15094	21.68987	13.8959	21.46141
1	2015	26.29893	20.5845	20.36733	20.82603	13.92449	21.74377
1	2016	26.43061	21.12326	21.04417	21.47633	13.95308	21.73237
1	2017	26.52877	20.85055	20.65055	19.8945	13.98166	21.79077
2	2013	24.59407	20.27338	20.14023	19.88834	13.49897	20.57862
2	2014	24.72299	17.46278	21.12467	19.32096	13.52756	21.43004
2	2015	24.87539	0	21.0129	17.75481	13.55615	21.90426
2	2016	25.00457	20.20972	21.0017	17.50532	13.58473	21.44436
2	2017	25.18084	20.13854	21.42615	14.07412	13.61332	21.4856
3	2013	24.99714	19.94782	20.80475	19.43679	14.03398	19.87053
3	2014	25.11067	20.02507	21.35408	19.93493	14.06257	21.81735
3	2015	25.30429	15.60226	21.46028	20.60476	14.09116	22.03856
3	2016	25.38156	20.55145	21.9049	20.68846	14.11974	22.22135
3	2017	25.50487	20.36059	20.39378	19.82264	14.14833	21.86172
4	2013	23.78754	19.84065	17.34187	17.8361	12.50306	17.28875
4	2014	24.11172	0	0	18.28103	12.53164	20.77936
4	2015	23.96092	16.15828	19.67038	18.33289	12.56023	21.53439
4	2016	24.13375	16.95361	17.91981	17.2993	12.58882	21.29939
4	2017	24.23475	19.86232	21.18996	17.09737	12.61741	20.63837
5	2013	23.52675	19.33377	19.52162	17.73688	11.64255	18.60188
5	2014	23.65893	18.60564	19.90626	15.2186	11.67113	20.17159
5	2015	23.86522	17.61749	20.29687	17.72102	11.69972	20.63614

5	2016	24.00339	18.3074	18.95007	16.95271	11.72831	19.96257
5	2017	24.20099	18.40689	20.15087	17.36263	11.7569	19.70513
6	2013	24.05361	6.991453	20.13754	18.57989	12.67339	20.06638
6	2014	24.23958	19.74355	19.26189	19.53657	12.70198	20.67044
6	2015	24.35319	18.95054	19.87736	19.00869	12.73056	20.05688
6	2016	24.53686	19.57838	19.91215	19.02811	12.75915	19.821
6	2017	24.66253	19.45383	20.79073	19.13788	12.78774	19.14559
7	2013	24.02582	20.38499	20.86181	18.55731	13.67976	20.00327
7	2014	24.12019	18.72114	20.82883	20.15989	13.7641	21.79473
7	2015	24.21732	18.86569	20.36636	19.792	13.84844	21.67912
7	2016	24.32621	18.23351	19.71239	19.40665	13.93279	21.61611
7	2017	24.39688	18.33817	21.01044	18.91117	14.01713	20.73545
8	2013	23.95189	19.14436	19.62815	17.87592	13.7403	21.66409
8	2014	24.04729	17.95334	19.95977	14.77322	13.82464	22.08409
8	2015	24.15425	17.68316	19.99132	18.03822	13.90898	22.05836
8	2016	24.23559	17.38109	20.1153	18.85383	13.99332	22.02856
8	2017	24.33847	18.57948	21.71507	18.22699	14.07766	20.55193
9	2013	23.85741	19.88092	21.81968	19.66579	14.1783	20.66298
9	2014	23.96913	20.47398	21.10952	18.91267	14.26265	22.31517
9	2015	24.07299	18.43399	21.32935	18.52507	14.34699	22.41901
9	2016	24.18024	19.93198	21.04529	19.16166	14.43133	22.48654
9	2017	24.2815	20.54469	21.47797	18.94651	14.51567	22.08226
10	2013	23.78997	17.38222	19.62305	14.52487	12.66086	20.186
10	2014	23.96913	18.39088	20.09648	17.74158	12.68066	21.37537
10	2015	24.02125	18.92521	19.65231	16.70903	12.70046	21.52793

10	2016	24.12925	19.22134	19.25672	15.98229	12.72027	21.74994
10	2017	24.25177	18.80506	20.45861	17.65732	12.74007	21.65561
11	2013	23.04927	19.11132	19.61157	19.27482	11.95186	21.03919
11	2014	23.17977	18.15172	18.93751	19.5807	11.97167	21.3454
11	2015	23.28975	18.75063	19.63342	19.33654	11.99147	20.83538
11	2016	23.38087	16.40628	19.2424	18.85896	12.01127	20.95932
11	2017	23.48643	19.0902	19.77018	18.03948	12.03108	20.85291
12	2013	25.50553	20.81237	21.28374	19.56552	14.19948	20.15421
12	2014	25.67259	18.86016	20.33982	17.70322	14.21929	21.54225
12	2015	25.86498	20.55904	20.39219	17.66532	14.23909	21.23089
12	2016	26.00387	20.22363	20.48162	19.21172	14.25889	21.52929
12	2017	26.15981	20.13491	21.25062	19.75591	14.27869	20.51586
13	2013	24.26196	18.33512	20.06491	14.13247	12.88777	20.09347
13	2014	24.40189	19.02333	20.4636	18.71536	12.90757	20.62498
13	2015	24.57948	18.56036	19.11822	18.50612	12.92737	20.48873
13	2016	24.69599	18.51153	19.48711	18.61485	12.94717	20.11944
13	2017	24.93823	19.04458	20.31709	17.79161	12.96698	20.80059
14	2013	24.8714	19.31022	20.4132	20.0113	13.23348	18.81284
14	2014	24.92663	19.51774	20.55486	19.66453	13.25329	20.25452
14	2015	25.16055	19.09668	21.03039	19.27184	13.27309	20.65318
14	2016	25.21265	18.85887	20.27577	19.77523	13.29289	21.4648
14	2017	18.45734	16.94577	20.44901	19.28517	13.31269	20.80993
15	2013	24.84411	19.31391	21.40388	19.94371	13.90735	20.0426
15	2014	24.90155	19.38384	21.51608	19.61302	13.92715	21.81006
15	2015	25.19775	18.58007	21.35247	19.07306	13.94696	22.05085

15	2016	25.17809	19.91995	20.95566	19.68272	13.96676	22.02853
15	2017	25.34392	19.78181	20.76268	19.31282	13.98656	21.91142
16	2013	25.69178	19.17868	21.18888	21.03559	13.98874	21.70955
16	2014	25.78398	19.16616	21.52875	21.12435	14.00855	21.4331
16	2015	25.97116	17.85628	21.8739	20.94637	14.02835	21.65541
16	2016	26.06166	20.21857	20.21715	21.19472	14.04815	21.93031
16	2017	26.1737	20.10469	21.14286	20.08963	14.06795	20.7448
17	2013	24.83927	19.78652	20.2462	18.89575	13.77202	20.21811
17	2014	24.97419	18.77006	21.44201	16.49995	13.79182	20.94722
17	2015	25.16855	19.96171	21.88016	19.04571	13.81162	21.13171
17	2016	25.25313	19.40497	20.71642	18.54944	13.83143	22.11865
17	2017	25.33763	19.86056	20.9683	19.45286	13.85123	21.19533
18	2013	25.19527	0	19.44097	17.38675	13.36194	20.1609
18	2014	25.39124	17.62217	19.43765	17.52	13.37781	20.97721
18	2015	25.72142	18.92073	19.67718	18.5409	13.39369	21.24189
18	2016	26.0053	19.49562	19.20385	18.35062	13.40956	21.21962
18	2017	26.22535	19.54726	20.71006	17.77469	13.42543	20.61275
19	2013	25.1671	12.61154	20.05208	17.66185	13.51308	20.65508
19	2014	25.37325	16.16831	20.05401	20.31263	13.52896	20.79662
19	2015	25.51802	17.78863	20.10153	19.7356	13.54483	20.87278
19	2016	25.70533	19.57261	20.76609	19.92911	13.5607	20.92269
19	2017	25.88783	19.7998	20.74904	19.29521	13.57658	20.85457
20	2013	24.81641	18.83873	19.45244	19.28618	13.24045	19.54829
20	2014	24.94764	18.1191	20.31058	18.52341	13.25632	20.62076
20	2015	25.08625	18.85181	19.75779	18.51256	13.27219	20.78632

20	2016	25.20123	17.37086	20.4392	19.86194	13.28807	20.8035
20	2017	25.33676	15.96027	20.70638	19.3608	13.30394	20.39791
21	2013	25.29328	17.01418	20.70561	19.75571	13.81987	21.04614
21	2014	25.42137	16.7205	20.35657	19.28683	13.83574	21.57689
21	2015	25.58442	18.89561	20.18164	19.26429	13.85162	21.72361
21	2016	25.72824	20.11727	20.68066	20.0035	13.86749	21.43495
21	2017	25.87666	20.72206	20.52092	19.79766	13.88336	21.51127
22	2013	26.15951	20.62234	21.01452	21.31763	14.36345	20.86749
22	2014	26.2981	18.76784	20.95442	20.86509	14.37933	21.55065
22	2015	26.4813	18.62444	20.47473	20.55695	14.3952	21.54113
22	2016	26.629	16.30042	20.76136	20.75962	14.41107	21.64374
22	2017	26.76808	18.41013	20.14676	21.151	14.42695	21.32956
23	2013	24.66191	21.33069	21.19102	18.57869	13.80079	21.37825
23	2014	24.78481	13.25817	21.67481	16.62036	13.83616	22.47808
23	2015	24.94145	19.58199	21.54461	18.00492	13.87153	22.58469
23	2016	25.0241	19.59989	20.94226	15.65872	13.90689	22.54133
23	2017	25.08383	18.71663	21.69876	17.8427	13.94226	21.38849
24	2013	24.08849	18.41868	20.43452	16.85467	13.2889	20.70791
24	2014	24.2266	15.97313	18.43237	15.85697	13.32426	21.2525
24	2015	24.37216	16.36261	19.31767	18.185	13.35963	21.19033
24	2016	24.48663	18.86318	18.68773	17.47976	13.395	21.17157
24	2017	24.56883	17.6387	20.86174	16.94378	13.43036	20.70643
25	2013	23.40237	18.82947	20.17888	16.93118	12.46063	20.16892
25	2014	23.56094	16.99356	20.00603	19.16659	12.496	21.20457
25	2015	23.63567	0	19.93715	19.06121	12.53137	20.86879

25	2016	23.88018	18.89368	19.24963	18.3919	12.56674	20.95742
25	2017	25.88783	14.19395	20.58505	17.59827	12.6021	20.12365
26	2013	25.03597	20.13933	19.48401	19.51879	13.75701	20.73072
26	2014	25.17141	19.27439	19.46797	18.24314	13.79238	20.91875
26	2015	25.30437	14.82347	19.385	16.99591	13.82775	21.30537
26	2016	25.31844	0	20.32321	19.45779	13.86311	21.26046
26	2017	25.48273	17.46122	20.49417	18.85205	13.89848	20.79764
27	2013	25.36632	18.99448	15.42495	19.36746	13.84513	19.1325
27	2014	25.52594	18.72657	20.30647	18.30613	13.8805	21.613
27	2015	25.63239	19.41249	20.4217	19.57811	13.91586	21.52115
27	2016	25.72498	19.92775	20.51824	20.08493	13.95123	21.10194
27	2017	25.81255	18.98224	21.12476	17.24237	13.9866	21.19142
28	2013	24.73134	19.25359	18.98713	16.99351	12.96272	19.78618
28	2014	24.90538	17.27522	19.5147	14.95258	12.99809	20.83897
28	2015	25.24794	17.85205	20.12929	18.93511	13.03346	20.29853
28	2016	25.56706	18.07622	20.2419	17.95383	13.06882	20.87827
28	2017	25.7955	15.79237	20.58318	17.81935	13.10419	20.67081
29	2013	24.95581	19.19218	19.72005	19.49205	13.67324	20.12863
29	2014	25.05159	19.54184	19.16677	18.87828	13.70861	21.55091
29	2015	25.25192	18.66135	20.1703	18.61128	13.74398	21.4038
29	2016	25.37161	20.55245	20.52811	18.5824	13.77934	21.31314
29	2017	25.50818	19.40918	20.87983	19.04957	13.81471	20.39047
30	2013	24.43733	16.61887	20.38092	17.8842	13.3692	19.71947
30	2014	24.62471	16.52169	20.56417	15.61995	13.40457	20.91846
30	2015	24.91045	13.96393	20.45465	16.84481	13.43994	20.96471

30	2016	25.07876	17.21904	20.80781	17.54075	13.4753	21.10601
30	2017	25.25442	17.02514	21.22573	17.69904	13.51067	20.71063
31	2013	24.36665	17.96181	19.8421	19.16288	13.03875	19.57378
31	2014	24.51527	19.29461	20.11512	13.09138	13.07412	20.70228
31	2015	24.75968	18.97451	20.59708	17.17769	13.10949	20.99904
31	2016	25.01222	18.59531	20.80672	19.14956	13.14486	21.15964
31	2017	25.11889	18.17848	20.53724	18.27764	13.18022	20.73452
32	2013	26.15612	20.28228	21.44359	20.95454	14.42906	19.98437
32	2014	26.35437	20.03086	21.47305	20.13564	14.46443	21.19341
32	2015	26.56293	20.56564	21.76852	16.63659	14.49979	21.52567
32	2016	26.80111	22.01996	20.38391	20.77107	14.53516	21.44102
32	2017	26.9722	20.94189	22.26119	19.21527	14.57053	21.17855
33	2013	25.25573	20.89216	20.93174	21.49354	13.79554	19.94149
33	2014	25.37433	20.28962	20.71562	21.26962	13.83091	21.58995
33	2015	25.55684	19.94116	20.22133	20.19749	13.86628	21.46929
33	2016	25.73205	19.69964	20.94308	21.02912	13.90164	21.48905
33	2017	25.91191	18.55809	21.03139	19.50255	13.93701	21.37976
34	2013	24.93791	18.9341	19.27339	17.96857	13.58201	20.17257
34	2014	25.04961	16.81125	20.70795	18.97	13.61738	20.80623
34	2015	25.17584	12.42922	20.86324	20.18085	13.65275	21.15807
34	2016	25.32885	18.73257	21.11424	20.35405	13.68811	20.94673
34	2017	25.40359	18.13951	21.36443	19.69781	13.72348	20.89314
35	2013	25.11675	17.55556	19.59006	17.30296	13.68035	20.28065
35	2014	25.21805	18.12994	19.60682	17.22156	13.71572	20.94276
35	2015	25.39531	19.17544	19.65082	15.53746	13.75109	21.24

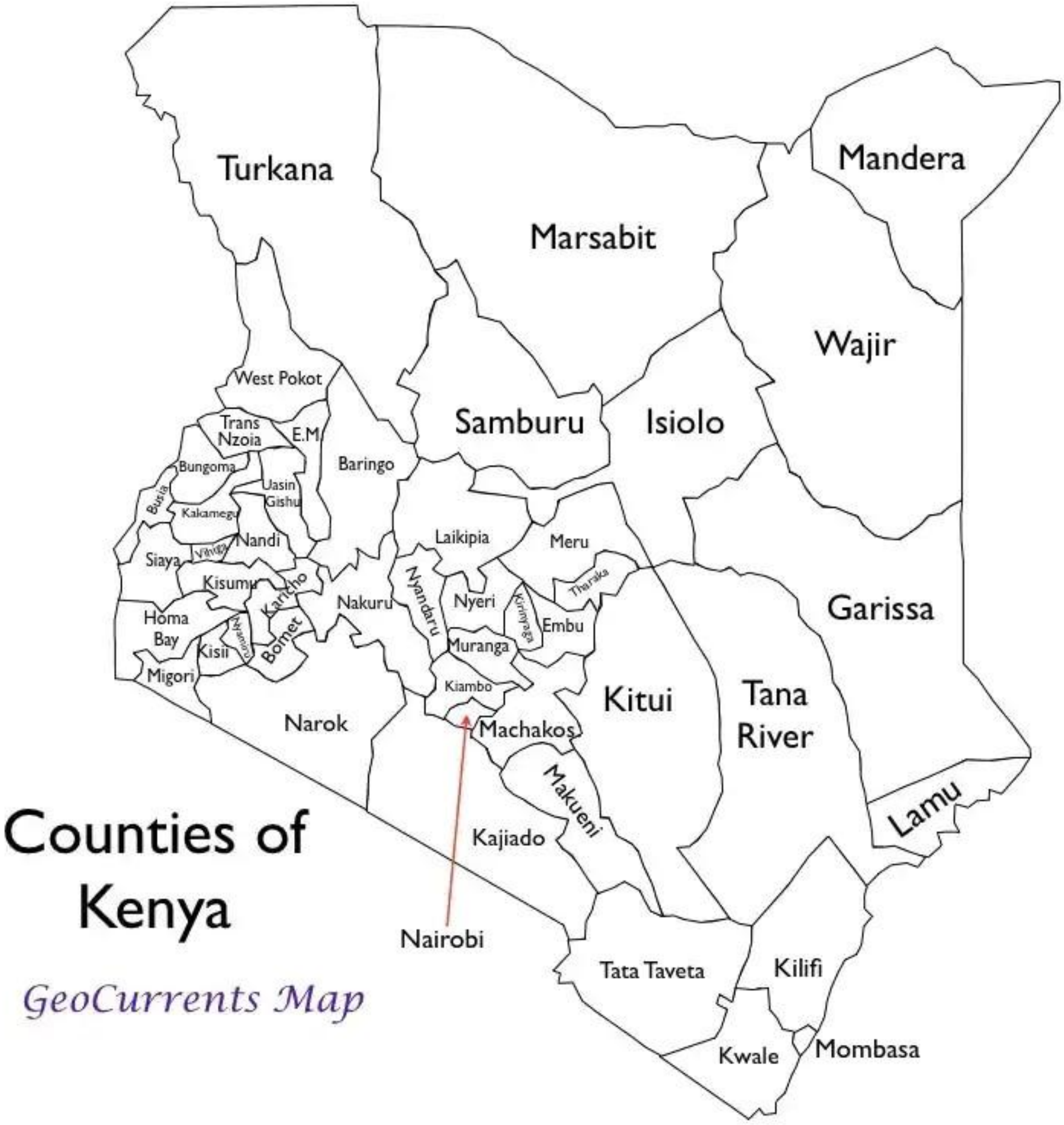
35	2016	25.51372	18.69048	19.68898	18.54613	13.78646	21.4276
35	2017	25.64178	19.58189	20.6276	18.76138	13.82182	20.71951
36	2013	24.97996	17.15483	18.89006	17.37083	13.63427	21.26471
36	2014	25.13978	16.54501	16.33159	17.30166	13.66964	21.44303
36	2015	25.35902	15.64167	18.44342	16.89923	13.70501	21.55655
36	2016	25.60414	18.24108	17.39764	17.45382	13.74037	21.12335
36	2017	25.79574	18.26449	20.60086	16.75127	13.77574	20.58806
37	2013	25.36859	17.062	21.5862	21.63483	14.42149	21.14122
37	2014	25.49392	20.08608	21.26863	19.77303	14.44618	21.85697
37	2015	25.67526	17.99741	20.35638	20.02161	14.47088	22.16937
37	2016	25.77596	14.59024	20.96437	19.92674	14.49557	22.37361
37	2017	25.93036	19.52023	21.2162	19.62653	14.52026	22.07909
38	2013	24.2178	17.90149	19.84836	18.20962	13.32481	19.72056
38	2014	24.37616	18.58439	20.16921	19.38311	13.3495	20.96321
38	2015	24.55544	18.1002	19.92498	19.17784	13.3742	20.69309
38	2016	24.65511	19.29727	20.00443	18.63553	13.39889	20.49149
38	2017	24.80165	21.44583	21.91267	18.1524	13.42358	19.51081
39	2013	25.21287	21.00641	21.50364	21.66759	14.40343	20.14723
39	2014	25.46908	19.93476	21.68801	20.16187	14.42813	21.66355
39	2015	25.60067	20.14666	20.697	18.96913	14.45282	21.82948
39	2016	25.75146	19.55746	20.59525	18.06841	14.47751	21.3353
39	2017	25.93553	19.85945	21.29388	19.15691	14.5022	21.13343
40	2013	24.41022	16.73328	20.75815	17.4354	13.19699	19.55786
40	2014	24.60186	19.32161	20.64111	16.09206	13.22169	21.42885
40	2015	24.80329	17.91185	20.41151	19.1571	13.24638	21.63443

40	2016	24.94593	19.67513	19.87683	19.61668	13.27107	21.39805
40	2017	25.18586	19.38565	20.83339	19.27875	13.29576	20.79854
41	2013	24.50377	20.04835	19.17868	17.79011	13.72703	19.7568
41	2014	24.70261	19.44888	20.55375	18.87938	13.74781	21.1063
41	2015	24.94583	19.34665	20.95046	19.18791	13.76859	21.33036
41	2016	25.13242	17.34422	20.29747	18.3919	13.78937	21.40805
41	2017	25.27993	17.89084	21.024	18.68813	13.81016	20.47169
42	2013	25.63163	20.21544	21.3052	20.83452	13.86706	18.40998
42	2014	25.75145	18.43217	21.02014	20.08668	13.88784	21.02067
42	2015	25.83225	15.35238	21.47897	20.60639	13.90862	21.32686
42	2016	25.92265	18.065	20.95137	20.18016	13.9294	21.40766
42	2017	25.99364	17.72753	21.32333	19.42785	13.95019	20.32184
43	2013	24.80141	18.80254	20.43745	15.55482	13.86176	21.03919
43	2014	24.97246	19.15155	19.29528	15.24407	13.88255	21.3454
43	2015	25.12446	16.09891	18.33686	16.75828	13.90333	21.36676
43	2016	25.29572	19.45798	20.04021	17.68736	13.92411	21.07217
43	2017	25.4612	17.21571	20.94611	16.27722	13.94489	20.79858
44	2013	24.69186	20.55579	18.75715	20.13762	13.81218	20.73189
44	2014	24.85097	15.49021	19.80573	18.79148	13.83296	21.3682
44	2015	24.991	17.98031	20.39195	17.92032	13.85374	21.49
44	2016	25.09269	15.78262	20.29499	18.67675	13.87453	21.349
44	2017	25.29112	20.62099	19.73384	16.91791	13.89531	21.33791
45	2013	25.19151	19.68028	20.74424	19.98731	14.04039	21.17795
45	2014	25.33509	19.4555	20.26219	19.62434	14.06117	21.54898
45	2015	25.53359	19.00284	20.77483	19.79153	14.08195	21.65571

45	2016	25.62774	19.75373	21.23526	19.93219	14.10273	21.42383
45	2017	25.82036	20.48114	21.11013	20.35757	14.12352	21.36577
46	2013	24.77399	19.59161	20.73658	15.60295	13.3849	20.40317
46	2014	24.9075	18.87246	20.91444	18.55869	13.40568	20.9684
46	2015	25.02884	0	20.67836	18.71318	13.42646	20.97336
46	2016	25.28538	19.01484	20.38428	18.46288	13.44724	20.70225
46	2017	25.36031	19.22622	20.76468	18.86854	13.46803	20.08397
47	2013	27.63409	22.87129	22.53542	22.41371	15.1084	21.35104
47	2014	27.73326	22.47299	22.57279	21.32412	15.14569	21.55545
47	2015	27.83833	22.50179	22.75714	21.9986	15.18299	22.15026
47	2016	27.95271	22.80437	23.14186	22.87922	15.22028	22.05292
47	2017	28.03135	22.40488	22.68957	22.68612	15.25758	21.50228

Source: Kenya National Bureau of Statistics, Gross County Product(2019) and Controller of Budget Reports (2013, 2014, 2015, 2016, 2017)

Appendix 3: Map of Counties in Kenya



Source: Geo Currents Map (2020)