IMPACT OF REAL ESTATE SECTOR GROWTH ON THE TAX REVENUE GROWTH IN KENYA

PRESENTED

By

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DECLARATION

This research project is my original work and has not been submitted for any award in any other university.

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Supervisor Declaration

This research project has been submitted with my approval as a university supervisor for an award of Degree in Master Of Arts- Economics.

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DEDICATION

To my husband Dr. Leonard Njeru, my sons Jonathan, Justin and Jesse, my mother and my late grandmother Victoria Nyang'ate. Thank you all.

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ABBREVIATIONS

ADF	Augmented Dickey – Fuller
Agri	Agriculture
ANOVA	Analysis of Variance
BLUE	Best Linear Unbiased Estimator
CLR	Classical Linear Regression
ETR	Electronic Tax Register
Exter Sec	External Sector
GDP	Gross Domestic Product
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
KRA	Kenya Revenue Authority
LCU	Local Currency Unit
Manu	Manufacturing
OLS	Ordinary Least Squares
PAYE	Pay As You Earn
PP	Philips –Perron
PWC	Price Water Coopers

REV	Revenue
TMP	Tax Modernization Programs
VAT	Value Added Tax
VIF	Variance Inflator Factor.
ZA	Zivot – Andrews

ABSTRACT

This study sought to examine the impact of the growth of the real estate sector on the tax revenue growth in Kenya. The study was based on secondary time series data collected for the period 1984-2017. An OLS regression model was employed in the assessment of interrelations between the variables of interest. The results of the regression model revealed that 1% growth in real estate sector significantly increased tax revenue growth by 0.12%. A 1% growth in the manufacturing sector produced 0.98% significant increase in tax revenue. It also emerged that a 1% growth in the agricultural sector caused the tax revenue growth to slow down by 0.69%. In addition, the results showed that 1%increase in the growth of real estate sector and tax reforms resulted in a 0.12% and 3.09% significant increase in tax revenue, respectively. The results further established that growth in GDP and the external sector did not have a significant effect on tax revenue growth. The study thus recommends that the Kenya Revenue Authority (KRA) should continue innovating on measures for continued increase of tax revenue from the real estate sector since the impact is positive and significant. In this regard, KRA should pursue awareness programs and campaigns to encourage and remind citizens to pay their taxes. In the same light, the government should offer tax incentives to property owners.

CHAPTER ONE

INTRODUCTION

1.1 Background

Kenya as a state depends on taxation as the main revenue source for the government expenditure. The responsibility of revenue collection lies with the Kenya revenue Authority (KRA). Included in the tax revenue are different tax streams ranging from corporation tax, withholding tax, Value Added Tax (VAT), import duty, excise duty to Pay as You Earn (PAYE). Revenue from taxes formed about 80.4 % between 1995 and 2004 and 90% between 2005 and 2012, of the total government revenue.

Businesses and individuals' taxation is the core revenue income source for the provision pf services and goods to the public by the government. This is important to Kenya's economic growth. Revenue from taxes funds development projects in infrastructure including construction of roads, railways, airports, water supply and power supply infrastructure. It also funds public and social services of health education, defense, law enforcement, public administration and social security. All these combine to form friendly environment for businesses to thrive in.

The real estate sector forms part of the profit generating businesses that are also supposed to pay taxes. The sector is levied VAT (charged on commercial sector) and income tax for both the residential and commercial sectors.

Past research and studies have correlated the real estate sector growth to overall economic growth of a state buoyed by increased taxation revenue. However there is limited data and information to substantiate the revenue trends in Kenya, despite the evident upward growth in the sector. There is further growth expected from the capital gains tax that has been reintroduced in the country. The tax stream, while constitutional, has not been consistently levied since inception of cap 470 in 1973.

The government has made efforts to improve its tax productivity and collection including taxes from the real estate. This has been through tax system restructuring over time. For instance, the tax modernization program (TMP) was introduced in 1986 some of its objectives encompassed; raising the tax revenue quota vis-à-vis the Gross Domestic Product (GDP) by a 22% margin by the end of the millennium; sealing tax leakage loopholes by through pursuit of structural changes aimed at making the tax system more efficient; to reduce compliance and administrative costs by introducing systems for self-assessment and increase the education and awareness of taxpayers.

In the continuous effort by the government of Kenya to increase tax productivity, KRA was formed in 1995 and came into operation in 1996 as an administrative reform. This administrative tool saw the collected tax revenue increase from approximately Ksh.127 billion to Ksh 299 billion between 1996 and 2005. As another administrative reform, in 2005, Electronic Tax Registers (ETR) was introduced to ensure the full remittance of the VAT. In 2007 the provision for imposing VAT on the non-residential buildings was accepted by the government. In 2012, as a strategy for KRA to increase its collection from real estate, it established real estate sector office focusing on matters to do with real estate sector. The main focus was to be on data collection on the landlords, including their geographical location, geographical information system, and the risk profiling of the same and dispatching the same analysis to conduct audits and collect the taxes due. While the response has been slow, more incentives including are being implemented like the Tax amnesty on the real estate in 2015.

It is estimated that only 65% in 2000/2001 and 66.9% in 2001/2002 of collectable income tax was collected by the KRA (KIPPRA, 2004). The reform process has had many challenges; most stand out being the large untaxed informal sector and non-compliant real estate sector and revenue leakages of high levels.

The Kenyan tax reform sequencing was poorly done According to Karingi, Wanjala, Pamba, & Nyakan(2005). The reform process saw the reforms on policy preceding reforms on tax administration, In 1986, the tax policy reforms were introduced while

KRA was formed in 1995 as an administrative reform. This can be seen in the lagged collections of revenue totaling close to Ksh. 62 billion with respect to income tax and Ksh. 28 billion sourced from VAT as of 2004, due to this discrepancy (Institute of Economic Affairs, 2012).

In the period 1974 to 1985 taxes on both individuals and corporations were high. In 1974 Domestic Corporations were taxed at 45% while foreign corporations were taxed at 52%. (Karingi S. , Wanjala, Kamau, & Nyakang'o, 2004), in their analysis of the tax revenues, established that taxes collected on personal income top bracket was at its minimal where the marginal tax rates on personal incomes span between 10% to 65%. This might have been due to high tax rate that discouraged people from reporting all the income earned. To harness benefits and growth of these taxation initiatives and bring about the expected results, the taxation of the sectors requires special tax strategies and administrative strategies to ensure that all sectors adhere to the tax compliance.

The selling of land and buildings together with rights to use and enjoy, consist what can be defined as real estate industry. This sector is composed of the residential and and commercial real estate (including industrial property used for manufacturing).In Kenya, residential property can be owner occupied or owning a property for rent out for residential purposes. Commercial property is mainly acquired by buying, renting and leasing to occupy for commercial purposes, for instance, business office spaces, storage facilities, factories and sales showrooms focusing on making good returns based on the business's profitability.

The European Public Real Estate Association (2012), states that commercial property is very important in the functioning of commercial activities and society in general. The business in the world needs facilities provided fundamentally by the real estate sector. Additionally, the sector manages and makes sure that the right infrastructure is facilitated for various forms of businesses to thrive in; this includes engineers, architects and property valuers. Real estate sector therefore forms a source of economic growth and employment fundamentally. It also contributes to addressing two critical challenges in the

present times for the ever growing urban and rural population by providing livable and functioning cities and reducing the environmental effects.

In Kenya, the real estate sector has been on upward growth rate. The (KNBS, 2010), reported that construction registered the second fastest sector growth of 14.1 % in 2009 compared to 8.2% in 2008. The Kenya Economic Survey 2011, reports that the real estate sector was the high growth sector since it reported a growth of 16% in 2009 and 17.5% in the year 2010. The same Kenya Economic survey 2010 data reveals sustained growth in construction of private homes. The real estate sector continues to grow robustly (economic survey 2014) therefore it can be concluded that there is rising demand and investor confidence in the entire sector. Kenya's GDP grew from 44.1 billion US dollars to 55.2 billion US dollars in 2013 marking a 25.3 per cent growth; the real estate sector contributed 5.9% to this growth accounting for significant contribution to the country's GDP. The Knight frank (a management company for real estate), its 2012 wealth report ranked Nairobi as one of the rapidly growing hotspots for real estate investments in Africa. Between January and December 2011, property prices rose by 25% while in London (United Kingdom) it rose by 12.1% and Beijing (China) it rose by 8.1%.

As per KNBS (2014) the real estate sector was rapidly expanding and was standing as the 4th largest contributor to the GDP of the nation. National data indicates the sector's benefaction to the GDP, rose from 4.9% to 10.6% in 2013/2014. This contribution plus industrial, manufacturing and agricultural production have placed Kenya in the lower level middle-income earner country since per capita income increased to 1,246 US dollars from 999 US dollars. This middle class desires and demands quality infrastructure and quality life in well-designed properties in safe and secure locations. This class of people is able and willing to pay premiums to have such for the better life. Real estate sector attracts key business investments **(**Fujita, Krugman, & Venables, 1999**)**. In the developed countries, the residential sector plays a special role **(**Lee, 2000**)**. It increases happiness in the society. This has led to all the developed countries' public policy trying to increase homeownership rate **(**Ades & Glaeser, 1994**;** Dietz & Haurin, 2003**)**

According to Foundation (2012), in the United States, one of the important economic engines is commercial real estate development; creation of jobs and income by the sector, significantly contributes to the U.S. economic growth. Commercial buildings' value is larger than their construction expenditures summed or rather these expenditures assessed valuation. A ripple effect is created by the sector in the whole economy; for instance, direct spending for new development, construction and expenditures maintenance on existing buildings annually, increase people's incomes. The ripple effect from other economic benefits, come from spending the wages and salary earned from the construction industry and the purchases of services and material by suppliers for construction directly. The direct and indirect expenditures combined, contributes to the national economy.

As per Bureau of Economic Analysis, the economic output injected into Massachusetts' Gross State Product by the real estate segment, amounted to $61,041 million equivalent to 15.6% of the total output. This was attributed to construction of homes, real estate brokerage, lending in the mortgage market, insurance titles, rental and leasing, appraisal of homes and moving truck service. Generally the growth of real estate has been on an upward move. This can be seen from the construction activities throughout the country and the proliferation and demand of housing and commercial buildings in urban centers especially Nairobi.

The recent proposals in the real estate tax reforms are the proposals by Max Baucus, (The senate finance committee of the United States chairman). The proposals contained both negative and positive changes to the real estate owners (PWC-Real state alert march 2014). Positive since the proposals contained ways to eliminate barriers to investment in the real estate. Negative since the proposals contained ways to increase tax revenue for the government. The government revenue will be increased in some ways according to the paper. Key among these is the increase of depreciable lives from 39 years to 43 years. This will effectively reduce the deductible expenses and increase taxable income from the profit making organizations. This can be related to the "capital deductions" in Kenya. However, in Kenya the depreciable life is much less therefore reducing taxable profits.

The major tax heads affecting real estate includes: Income tax and withholding both residential and non-residential (cap 470). Value added tax (VAT) for non-residential since 2007 (cap 476). This study focuses on whether the tax revenues are responsive to the improvement of the industry over time.

1.2 Statement of the Research Problem

According to statistic from KNBS (2019), the Kenyan Real estate sector has grown exponentially over the past two decades. This is evidenced through its share to the gross domestic product, which stood at about 11% in 2000 to 12.6% in 2012. By 2016, the sectors was accounting for a 13.8% to now 15% in 2018. Many drivers for this exponential growth lies behind infrastructural development, stable GDP growth, rapid urbanization as well as high total returns in the private sector. Despite this impressive proliferation of the real estate segment in Kenya, limited literature linking its share in the tax revenue exist. Real estate sector is a key tax base in developed countries and thus its role in developing countries, where Tax revenue targets are never met needs to be empirically investigated. Given that Kenyan tax revenue collection has also been below the target, this study intends to investigate the role played by real estate sector growth on tax revenue growth.

1.3 Research Questions

Answers to the hereby queries were sought during the course of this study:

1. What is the pattern of real estate Sector growth in Kenya?
2. What is the effect of the real estate sector growth on tax revenue growth in Kenya?
3. What policy measures can be undertaken to improve tax productivity from the real estate sector?

1.4 Research Objectives

1.4.1 General Objective

The study examined the impact of the real estate sector growth on the tax revenue growth in Kenya.

1.4.2 Specific Objectives

During the course of this investigation, the intent was to:

1. Determine the trend of the real estate sector in Kenya since 1984,
2. Examine the effects of real estate sector growth on tax revenue changes in Kenya.
3. Suggest policy measures to improve tax productivity from the real Estate sector

1.5. Justification of the Study

Most of the literature on real estate and tax revenue has paid attention on tax compliance of the sector, challenges facing the sector's productivity and general sector's contribution to the economic growth, determinants of tax productivity, and the GDP, and tax reforms. In Kenya, a more comprehensive examination of the ramifications imposed by proliferation of the real estate industry on the country's tax revenue is still lacking.

The research assesses the impacts of the growth of the real estate sector on revenue productivity in form of tax, while taking advantage of a much recent period between 1984 and 2017. The industry is a critical component of any country's economy; its true contribution to the tax revenue should be established with a high level of certainty, and this study aims to do so. Without a study of a similar magnitude, the vital role that the sector plays in tax revenue growth and economic growth will remain uncertain.

The findings contribute to policy formulation on the sector and growth enhancement and regulation of the impact on the Tax revenue. These are expected to guide KRA

management and administration to develop and implement measures focusing on improving tax revenue productivity from this sector. The study is also be relevant to the future research reference for researchers aspiring to carry out further research studies on this particular area.

1.6. Scope of the Study

The focus of interest for this study was on the Kenyan real estate industry, particularly the sector's contribution to the tax revenue productivity over a period of 33 years, using time series data. Other factors such as economic growth tax reforms, agricultural sector, manufacturing sector and external economy were included in the study. Relevant literature to the study was drawn from all over the world.

1.7 Organization of the Study

The reporting of the present investigation was structured in five chapters. The first chapter serves to shed light on the topical issue and convincing justification for embarking on the study. The second chapter looks into various theories and existing empirical evidence that provide further guidance to understanding the study's underlying motives. The third chapter is dedicated to spelling out the methodological steps undertaken in the design, gathering and analysis of data for this investigation. Chapter Four presents the results generated from the analysis of this study's data. The fifth chapter marks the ending of the present study wherein, summary of pertinent findings, subsequent conclusions, as well, as relevant recommendations are discussed.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is concerned with various arguments that have been advanced by other scholars in connection to the subject of the present study. In particular, this chapter is intended to review and critique these arguments anchored on theoretical frameworks and the underlying empirical works of various scholars. The chapter closes with a brief recap of the key issues discussed.

2.2 Theoretical review

2.2.1. The Theory of Lifeblood of Taxation

The theory of taxation observes that it is necessary for a state to have a government. Such a government cannot continue without paying for its expenses. The means of the government to pay for its expenses is by compelling the citizens of its country and the property within its jurisdiction to have a contribution share to the basket from which it can pay for its functioning. The government will not function properly without taxes, for shortfall of the necessary power needed to operate it. The government is supposed to reciprocate by providing public goods that improves people's lives and makes a country a safe place to live. This theory leads us to the theory of public finance theory.

Al-Zeaud (2012) states that the government will determine its fiscal policy (both the expenditure and tax revenue), based on government programs cost-benefit analysis. Mioara and Florina (n.d) made emphasis on this in a research in Romania with regards to the relationship between budget on public expenditure and national revenue productivity, the results supported the fiscal synchronization hypothesis i.e. Government spending causes revenue and vice versa.

2.2.2. Smith's Maxims of Taxation

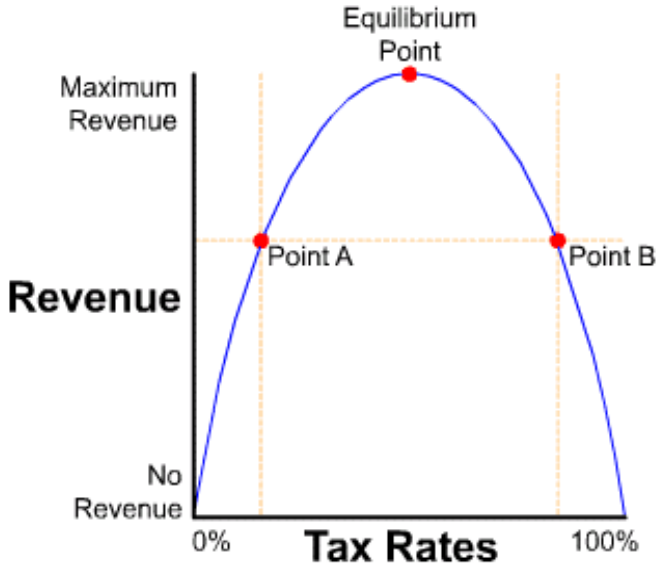
This theory states that; individual and non-individual components of states ought to make their contributions towards governmental support is aligned to their abilities. This means that their contribution should be proportional to the revenue enjoyed. The theory also posits that all tax needs need to be levied during the time or in a way that the contributor can conveniently pay for it. For example, tax levied upon the rent of land or houses, is most convenient at the same time such rents are paid, (this is the time that the payer has the revenues to pay for the taxes). This theory can be seen in the PAYE and withholding taxes in Kenya

2.2.3 Ibn Khaldun's Theory of Taxation (Economic Theory)

This theory recommends tax rate which are low so that the levier (in this case, the government), will not tamper with the incentive to work and taxes are paid voluntarily. Ibn Khaldun posit that the consequence of increasing tax rates is reduced revenue and vice versa. The scholar further explains that cutting back on the rates results in increased revenue from taxation. The theory perceived the impacts of high rates of taxes on productivity and incentives and it has developed the optimum taxation concept. Following the theory of taxation, he assessed the effect of expenditure of the government on the economy of a nation and advocated for a productive public expenditure policy. The theory closely relates to the economic theory of taxation; laffer's curve.

The Economic theory associated with a graph called "Laffer Curve", (Laffer, 2004). The Laffer curve of the economic theory shows a maxima point of government taxation where taxes are at their maximum. Taxation beyond this point becomes counter-productive i.e discourages production, and therefore reduces the flow of revenue to the government.

Figure 1.1: Laffer Curve



The graph shows that there are two different rates (at A and B) at which the revenues are the same. Meaning that diminishing the tax rate imposed at B such that it is the same as that of point B would still see collection of some significant revenue, but the revenues are not at maximum at these points. Further examination of the graph indicates that there will be a generation of optimal revenue at point of 50% tax rate. In reality, things aren't quite that simple. At both ends, no revenue is collected by the government. As such for revenue to be raised by the government, it should levy a rate above zero % and below 100%. Beyond the rate of optimality, revenue starts to fall. This is because people loose incentives to work and therefore income available for government taxation starts to drop. However, this theory tend to lack logical support, because people need to survive thus would have the incentive to minimally cooperate with such a system to gain the necessities but will continue to work and willingness to pay taxes will fall. This is where compliance issues starts to crop in. This can be seen where a certain industry or sector of the economy is growing but tax revenues from such sectors are low. The incentive to work derived from this theory can relate to the theory of Ibn Khalduns theory of taxation.

Mitchel (2012) notes that the curve demonstrates high tax rates, decreases tax revenue more. The Laffer curve application is observed in the case of Ireland. In the year 1985, Ireland there were tax cuts. In that year, the tax revenue was 1.1%. The tax revenue progressively increased until 2004, when Ireland's tax revenue was at 3.6%.

Heady(1993) observed that for a framework of optimum tax to be formulated, there is need to assess the economy by combining different criteria. This can be possible by looking at household utility and social welfare. The complexity of the determining the most favorable tax rate lies on the derivation process. As such, the focus should be in instances when the tax is viewed as burden, how the composition of the structure of tax should be done to reduce the burden and to maximize on the revenue by the government.

Moalusi (2004) while assessing the casual relationship of fiscal spending, Friedman (1978**)** came up with a research hypothesis that, cuts in taxes are a budget deficit alternative when there are positive tax effects on the spending by government since the cuts in taxes increase the deficits which limit the spending by government. Another researcher, Abdul (2015) came up with an empirical research revealing that the theory by Ibn Khaldum can be applicable in the present times. Also, Chapra (2000**)**, Applauds the theory of Ibn Khaldun, that incentives of taxation and productivity were clearly brought out by Ibn Khaldun with optimization of taxation concept in his mind.

2.2.4. Tax Structure Development Theory

Tax structure development is associated with evolutionary pattern of taxes. It is the assessment of different strands of taxation in terms of growth and performance in virtually all economies of the world. The larger amount of income tax revenue is generated from government staff and large corporations in most parts of Africa. Kaldor (1981) noted that, a state is made with serious administrative difficulties in trying to sum up income for taxation purposes where there are no books records and lack frequent preparation of accounts or audits in extending the concept of taxation to artisans, small traders and professionals. The theory of tax structure development is a representation of

an historical legacy, exhibited in the policy and practices of several nations of the world overtime. Tanzi (1969); Webber and Wildavsky (1986) and Guy (1991) rreviewed the experience of several nations of the world with respect to the introduction, stoppage or reinforcement of various tax handles according to the dictates of economic condition.

2.3 Empirical Literature Review

Muriithi and Moyi (2003) in an effort to determine if tax reforms achieved the intended objectives, assessed tax reforms and mobilization of revenue In Kenya. According to the scholars, there was nothing known as to the effects reforms had on taxes. They applied tax elasticity and buoyancy and studied on both the periods before and after the reforms were rolled out. They analyzed the trend of the tax reforms for each tax head i.e. direct and indirect. The findings indicated a positive link between the reforms and the tax system both in totality and individual taxes. Comparing pre-reforms and post Reforms periods, they found out that reforms must have had more effect on the Elasticity than on buoyancy. They observed that the indirect taxes had lower elasticities than that of direct taxes after the post reform period. However, reforms did not achieve its objective of making VAT responsive to the changes in income levels.

The economic development in overall terms, the size of external trade sector and the income distribution per sector, creates a direct effect on taxable capacity as per (Bahl, 1971**)**. Bahl states that mining sector in particular; the taxable surplus is larger than other sectors, thus a determinant of taxable capacity. This is attributed to the Oligopoly kind of mining industry which crowds out large number of firms to operate, and therefore the administration of tax to collect taxes from the exports is made easier.

In the study "trends in taxation of developing countries" Chelliah (1971**)** observed that in addition to the income level in average terms and the degree of the economy openness, sectoral composition of GDP would also has significant effect on the taxable capacity of a nation. The study indicated that the share of mining of GDP was the most significant determinant of taxable base in developing countries in their present development stages.

Stotsky and WoldeMariam (1997**)**, used a sample population of 46 nations in the sub-Saharan Africa to assess the Sub-Saharan Africa tax Effort. The results found out that the shares of mining and agriculture in the GDP were the significant tax revenue determinants. Variables were negative and significant, but the export share positively affected the share of tax.

Ghura (1998) used 39 sub Saharan African countries as a sample and introduced different variables such as the level of corruption and macroeconomic policies over the period 1985 to 1996. in an effort to establish the impact of corruption and economic policies on tax revenue, in sub-Sahara Africa, found out that inflation and extent of corruption significantly and negatively impacts on the Tax/GDP ratio.

Tanzi and Davoodi (2000**)** empirically assessed the impact of corruption on the non-tax level of revenue and the total tax. They used 90 countries as a sample of over the period 1980-1997. They included trade and agricultural shares and real per capita income of the GDP as the explanatory variables in addition to corruption. The results indicated a negative significant influence of corruption on the tax revenue of the government. Additionally the results indicated that corruption negatively impacted direct taxes more than it impacted indirect taxes to include the VAT.

Another study by Davoodi and Grigorian (2007**)**, in an effort to establish the potential of tax and efforts of Armenia, used a cross-country panel regression analysis on 12 east European countries, included the quality of institutions, urban population size and shadow economy in addition to per capita income, inflation of the price of consumers, the sghare of agriculture in the GDP, the imports and exports ratio to DP as the explanatory variables. The results revealed that a shadow economy size and the quality of institutions are significant variables that impact the effectiveness of tax.

Bird, Martinez-Vasquez and Torgler (2006) suggested a clear and legal responsive factor. They state that, apart from economic structure which represents supply factors, demand factors such as corruption, other factors or variables that can affect tax effort significantly

includes voice and accountability. The study used 110 developing countries between 1990-1999 as a sample and analyzed data on determinants of tax revenues. Variable results were as follows: Per capita income (GDP) was positively correlated to tax revenue while there was no statistically significant influence of trade openness on the growth of population, tax revenue and the agricultural share in GDP resulted to lower levels of tax revenue. Also the inequality degrees, the shadow economic activities size and the legal framework of entry negatively influenced tax revenue.

A more recent study by Kadir (2013) regressed agricultural and industrial sector shares of GDP, economic rate of monetization, foreign debt stock, and rate of urbanization. The study results showed consistence with priori expectations. The Estimated results revealed that in Turkey, tax revenues are significantly affected by the explanatory variables, but share of agriculture was negative. This study also revealed that international openness of trade did not have a significant influence on tax revenues in Turkey.

Teera (2002) attempted to establish the factors impacting tax revenues in Uganda by assessing the system of taxation and the structure of tax. The researcher employed a time series dataset for the period 1970-2000. The result of the research indicated that density of population, agricultural ratio. And evasion of tax impacted all taxes. The GDP per capita revealed that negative impact. The evasion of taxes and openness of trade showed a negative but significant influence.

Bird, Martínez-Vásquez and Torgler (2008), the study had similar results to that of Bird et al (2004). The results suggested that in addition to factors of supply, demand factors including quality of institutions significantly influence the tax effort determination.

Engen and Skinner (1996) gathered economic evidence from the US and other nations to show the link between the growth of the economy and taxation. They found that it was not necessarily obvious that high taxes negatively impact the growth of the economy, either in theory or in the data. However, the evidence was consistent with lower tax rates positively impacted the growth of the economy.

Luca (2012) employed the use of panel econometric techniques analyze the statistical significance of potential tax revenue determinants as a GDP share. Data was gathered from 32 Latin American nations for the period 1990-2009. The results of the research paid attention to the political and historical variable relevance towards understanding the tax revenue differences within the region. The results showed that civil liberties, participation of female labour force, age and population composition, the political security and education background significantly affected tax revenue.

Gupta (2007) analyzed the determinants of tax revenue performance in developing nations. The research employed a wide dataset and the outcomes showed that structural factors including agricultural share, per capita GDP, openness of trade and international aid significantly impacted the performance of revenue of the economy. Other variables that were used for the research included corruption, the nation's political state, share of indirect and direct taxes. The research revealed that the nations in the sub-Saharan Africa recorded better performance with regards to their potential. The research also found that some Latin American economies are still not able to reach their revenue potential.

Muhammad and Ahmed, (2010) assessed the tax buoyancy determinants by using a sample population of 25 developing nations. The outcomes of the research revealed that import growth and the growth of the manufacturing industry positively impacted on the collection of tax growth. Contrary to most studies, the impact of agriculture was established to be insignificant while the service sector was established to have a significant and positive effect on the buoyancy of tax. This could be related to the development and growth of the service sector in the 1990s. the budget deficit and monetary growth was established to positively influence the collection of tax by demanding the mobilization of more resources from the government. The growth of government grant was found to negatively impact the collection of tax revenue.

Leuthold (1991) established that trade share positively influenced the GDP by using panel data. The results also revealed a negative correlation between share of agriculture and the GDP. Ghura (1998), on the other hand, found that income and level of tax

revenue openness positively influences taxes while agricultural share on GDP inversely impacts taxes.

Recently, Mawejje and Munyambonera **(**2015) estimated tax elasticities of sectoral growth of output of the economy of Uganda. The research used the ARDL method of analysis. The results revealed that the largest hindrances of performance of tax revenue in Uganda include the dominance of the agricultural sector and the large informal industry. Further, the study revealed that the openness of trade, growth of the industrial sector and expenditure for development positively influenced the performance of tax revenue. With respect to developing a wide tax base, the researcher suggested policies that will support the development of value added linkages between the industrial and agricultural industry while pushing for the need to explore the potential of large contributions from the informal industry.

Tadele (2015) assessed the responsiveness of gross tax determinants to the growth of the economy in Ethiopia at a sectoral level. The results showed that the service sector share added value, import and the deficit of the government budget to the GDP influenced positively the buoyancy of gross tax revenue. The research made the recommendation that there ought to be a wider tax base and new taxes ought to be included in the tax net while eliminating all tax exemptions.

A study by Tanzi (1987) on tax structure development concluded that as counties grow, the multiplier effect on tax bases is more than income growth; this is because direct tax revenues are potentially more elastic than indirect tax revenues.

Roshaiza, Loganathan and Sisira (2011), aimed to investigate the influence of the growth of the economy on government tax revenue. They took a data sample for the period of 1970-2009 in Malaysia. The findings indicated a unidirectional correlation between the growth of the economy and the tax revenue of the government in the short run which contrasted to the theoretical and empirical evidence taxes influence resource allocation and often impact the growth of the economy.

Karran (1985), in his analysis to empirically examine the link between the growth of the economy and tax revenue revealed that taxes and a nation's economy always grow at the same time and as such the growth of the economy can either positively or negatively impact tax.

In 1998, a study by African Economic Research Consortium evaluated the Ghana's productivity revenue of tax system and individual taxes on the grounds of estimate of tax elasticities and buoyancies. The purpose of the research was to assess the connection between the tax reform and performance of revenue for the period 1983-1993. Moreover, the study assessed the ways for the mobilization of extra revenue. The outcomes of the research stated that tax reform significantly influenced individual tax and the whole tax system's productivity.

Another study in Kenya, Nyandieka (2012) aimed to assess the effect of reforms that have been undertaken in Kenya on the Income tax, Excise duty, Import duty and sales/Value Added tax on revenue productivity. Income tax is levied on individual and corporate incomes thus theoretically, as the economy keeps expanding; the contribution of this category of tax to revenue is bound to increase, assuming the reforms are aimed at broadening the tax base. Nyandieka used published secondary data to assess the link between tax reforms and revenue productivity and before, after piecemeal/policy and during the comprehensive reform buoyancy and elasticities were estimated using regression analysis. The period were divided into three; pre-reform, piecemeal reform and after reform periods. The regression results indicate that Kenya had an inelastic total tax for the three periods, but it was buoyant during the pre-reform and piecemeal reform periods. The results established that reforms positively impacted on income tax productivity and did not positively impact on VAT productivity. The positive influence of reform on income tax productivity was as a result of the effectiveness of the reform of income tax which simplified the tax system and resulted in lower rates of corruption and tax evasions while the low VAT elasticity resulted from the collusion between the tac collectors and tax payers and tax evasion. The study suggested that there is need for more reforms to be adopted, especially with respect to VAT inelasticity. The reforms to be

adopted include Exemptions and tax rate reductions, expanding tax base by increasing the number of tax collectors for monitoring and recruitment, imposition of stronger penalties for those charged guilty for tax evasion, imparting the tax collectors with audit skills, rental houses incomes, and absentee landlords' taxation.

According to Dickson and Presley (2013**)**, by examining the period 1981 to 2009 of the Nigerian tax system to study tax incentives and revenue productivity, in an effort to determine the short-run performance of different taxes revealed unsatisfactory degree of the tax revenue in Nigeria. This could be in relation to the failure of institutions, increased corruption in the system of taxation and management negligence of booth non-oil and oil revenue. The research observed that lagging federal revenue sources and non-buoyancy of the tax revenue is an indication of poor efforts by the system of taxation in Nigeria. The lowering of the fiscal deficit in the budget helps assess costly public expenditures. With the consideration of the importance of creating internal resources and becoming less dependent on external lenders to improve the growth and development of the economy, the research drew the conclusion that there is need for policy change in reference to the buoyancy of the tax revenue. Effective policy adoption that will assist in reducing or eliminating corruption in the system of taxation together with the inefficiencies accompanies by the system, ought to be put in place to boost the productivity of revenue.

Desmond, Archibold, Ithiel and Ziven (2013**)** used yearly time series data between 1975 and 2008 in an attempt to establish the productivity of revenue of the overall tax system of Zimbabwe and of taxes by individuals by estimating tax buoyancy. The results from the estimation indicated that the system of taxation and individual taxes were not buoyant while customs duty was exempted. In addition, majority of the coefficients of buoyancy were revealed to surpass the coefficients of elasticities. This means that discretionary mechanisms were employed to gather extra tax revenue during the time being studies. The outcomes show vital tax reform implications. An appropriate tax system in a developing economy is one that is buoyant and elastic, since it means that collection of taxes will automatically grow while the economy grows without a resort to more

discretionary changes that may be sensitive to the structure of taxation. The research recommended that some tools for increased tax productivity; tax administration improvements, tax evasion reduction and tax exemption reduction in order to improve the generation of revenue.

Harris and Wigwiri (1980), studied the revenue performance of the Zimbabwe. They used the dummy variable technique. They calculated the income elasticities and profits for tax revenues covering the years 1966-1977. The outcomes of the research confirmed the elasticity of profit and income taxes. Notably, some limitations were observed from the research. For example, they used a short time period of only 11 years. This short period cannot give us a meaningful statistical inference (Newbold, 1995).

Focusing on China Ma (2010) assessed the real estate contribution to the economy of China in 2009 and the components of house prices in the present dynamic market of real estate. The research employed the use of empirical analysis. The outcomes of the research indicated that there was a positive and significant impact of investments in housing to the growth of the GDP. The houses prices in China were found to have defied the fundamentals of the economy and were seen to depend on the prices of houses for the coming year and the related change level. Further, the research found that the house price deviation from the fundamentals of the economy implied that the housing market was probably going to collapse. The core driver for the increase in house prices was observed to be the expectations of continuing positive change in the prices of houses. Moreover, the reluctance of the central and local government to allow the decrease in prices of houses, the belief that land is a scarce natural resources particularly in the cities, previous trends of house prices, lack of regulatory policies, and challenges in manufacturing were contributing factors of the rise in prices of houses

A study by Venlauskiene and Snieska (2009**)** examined the real estate market and the slow-paced interaction in transient economies. The research employed a case study of the Republic of Lithuania. Secondary data GDP and mortgage credit was used for the time period 2000-2008. The outcomes of the research revealed that the real estate market

slowdown and buildup and the slowdown growth of the construction industry led to a recession in the market and overall economic slowdown.

In Dubai a research on the ramifications of proliferation in the country's real estate sector on the financial industry was conducted by Abdelgalil (2007)**.** Based on secondary data spanning the period 1985-2004, a significant link between the research variables was established. Further the research indicated that real estate share price had a significant influence on the price of purchasing the banks' shares.

In Malaysia Hui (2009) used Autoregressive Distributed Lag (ARDL) technique to model the effect of real estate on the country's economy. The scholars employed only secondary data from the GDP and the fluctuation of property price. The results of the research indicated that the Domestic demand and the GDP do not have an impact on fluctuations of property price for the long haul. This was assessed to be true given that an increase in gross investment from property booms is followed by a decrease in private consumption which alters the investments changes. Notably, with respect to short-term the GDP and demand stability to GDP to fluctuations of property price were found to be less predictable. Hence, it was debated that property booms are able to support a real economy provided that the prices of property can result to short-term pro-cyclical impacts on the consumption and investments. The results made the implication that activities that are stimulus in the property market do not give a guarantee for sustainable real economic growth. Regardless, activities of stimulus in the property market can be put to use as a polity mechanism for the control and management of the macro economy for the short haul.

Another study by Ong (2013) focused on Malaysis. The aim of the research was to assess the link between the macroeconomic variables (GDP, inflation, construction cost, rate of interest. Population, RPGT) and the prices of housing in the country. An exploratory design was employed using secondary data for the time 2001-2010. The research outcome revealed that RPGT, population and the GDP are the core housing prices elements.

Notably the housing prices showed no causal link with the RPGT, population and the GDP.

Long and Summer (1991) endeavored to unravel the relationship between investment in equipment and a country's overall economic growth. The research relied on the United Nations Project and the Penn World Table. It was found that a strong link is present between investment in equipment and machinery and the growth of the economy. The duo established that for the period 1960-1985, every extra GDP percentage invested on equipment resulted in a one third GDP increase annually. The research revealed that the connection between the variables may be deemed causal and that an increase I equipment investment lead to a fast rate of the economy growth. Additionally, the social return of investment on equipment in an effective market economy is in the rate of 30% annually.

A descriptive investigation by Mella (2016) aimed to assess the impacts of investments in real estate on the dynamics of pension fund in Kenya. The study used a census of 48 pension funds as at 2015 December. The researcher adopted a multiple regression model in the analysis of the gathered data. A strong and positive link was found between the investments in the real estate industry and the return on investments for pension funds. Additionally, the results revealed that offshore investments had a positive and strong correlation to pension fund performance. Further the results showed that mixed income and the securities by the government had a strong and positive impact on pension funds' performance while equities have a negative influence on pension fund performance: and fixed and cash deposits had a negative influence on ROI.

Wachira (2013) conducted a research assessing the link between capital market and the growth of the Kenyan economy for the period 1982-2012. The research employed a descriptive and regression method to analyze the data collected. It emerged that a positive, although weak linkage exists between GDP growth and variations in SMI. This was because the NSE 20 share index was represented by few organizations in the nation's economy and the GDP was measured using sales and not the profits. Foreign Direct Investments' changes revealed a weak nut positive correlation to the growth of GDP in

the economy. The research drew the conclusion that the CMA and the government ought to encourage other firms to join the securities market in Kenya and be part of the NSE 20 share index. The study however failed to show the interrelations pertaining to the dynamics of the real estate segment and tax revenue.

Loyford and Moronge (2014) embarked on a study to uncover the repercussions of variations in various economic factors on performance of the Kenyan real estate segment. The proxies used ranged from transaction cost, interest rate, housing demand and inflation as measures of economic growth. The target population was stratified via simple random sampling from every segment.The results from the research indicated that the indicators of economy namely, hosing demand, inflation, and transaction cost had a significant impact on the economy of Kenya.

A research by Kimani and Memba (2016**)** assessed the impact of rate of inflation, Interest rate and fluctuations of the GDP on the growth of the real estate industry in Kenya. The scholar utilized a vector auto regression model. Based off secondary data, the analytical results provided evidence for presence of a positive link between the country's exchange rate, inflation rate, GDP and prospective investments injected in the sector. Additionally, interest rate was found to correlate negatively with the proliferation of the industry

Ngumo (2017) endeavored to uncover the significance of changes in the pace of development in real estate sector on Kenya's economy. Descriptive statistics were employed to assess the connection between the variables of interest. Secondary data was extracted from the publications of the CBK wit respect to money supply and data from the website of the KNBS was used to gather data on the GDP. The data gathered covered the period 2007-2016. A pooled regression model was invoked in a bid to establish the interrelations within the data. The results demonstrated that a positive link exists between growth of the sector and the economy. Further, the research indicated that the relationship between rate of inflation, development of real estate, money supply and growth of the economy was significant. The research recommended that there is need for effective

control of rate of inflation, money supply, and real estate development since these three variables influence the growth of the Kenyan economy.

2.4. Overview Of The Literature

From the above literature review, it can be deduced that various researchers have engaged in determining the tax revenue productivity of countries across the world and the variables that determine the revenue capacity. It can be seen that most studies have used panel data across countries and few have used time series data. Some of the studies that have used time series data (Harris & Wigwiri, 1980) have span a few years short thus cannot give correct statistical inference.

Studies have look into economic sectoral components impact on tax revenue; industrial sector, imports, agriculture, mining, manufacturing, trade openness, service sector and level of income/ development/ economic growth. In general, most of the studies **(**Stotsky & Woldermariam, 1997; Bahl, 1971; Chelliah, 1971; Tadele, 2015; Karran, 1985; Ahmed & Mohammed, 2010; Karran, 1985; Leuthold, 1991; Mawejje & Munyambonera, 2015; Gupta, 2007; Bird, Martinez-Vasquez, & Torgler, 2006) found agriculture to be inversely related to tax revenues while level of income, Imports, manufacturing, service sector and mining sector have positive impacts on tax revenues. Other variables that were used include quality of institutions, tax reforms and corruption index. Tax reforms seemed to have positive impact on tax revenue **(**African Economic Research consortium 1998; Nyandieka, 2012).

In addition, studies by (Abdelgalil, 2005; Kimani & Memba, 2016; Loyford & Moronge, 2014; Ma, 2010; Mella, 2016; Ngumo, 2017) assessed the connection between real estate and the economy. The studies indicated that the relationship between rate of inflation and development of real estate, money supply and growth of the economy was significant. In addition, the results indicated that increasing the exchange rate resulted in an increase in potential investments in real estate in Kenya.

The current study will be different in the way that real estate sector will be included in the model. The real estate sector as a variable will be the main focus on how it affects the tax revenue and other variables such as level of income, agricultural sector, manufacturing sector, external sector and tax reforms will be used as control variables. Extended time series data will be used for the period 1984 to 2017. Real estate sector has been on the focus by the Kenya revenue Authority in the recent past. The Authority claims that the revenue tax from the sector is minimal compared to the rate at which the sector is mushrooming. We would like to measure the relationship of this sector growth with the revenue growth and look into any measures to be put in place to increase the revenue productivity from the sector if the relationship is positive as expected.

CHAPTER THREE

METHODOLOGY

3.1. Introduction

The section will look into theoretical framework of the study, econometric and model specification, the definitions, measurements and the expected signs of the variables in the model, estimation issues (diagnostic tests) and finally data type, sources and analysis.

3.2. Theoretical Framework

The study will adopt tax structure development theory, which is associated with evolutionary pattern of taxes. It is the assessment, in virtually all economies of the world, on the performance and growth of different strands of taxation. In most parts of Africa, large businesses and government employees forms the larger part of income tax revenue. For a country to increase its revenue tax, all strands of tax base needs to be included. i.e. all sectors of the economy should have a contribution share to the tax revenue growth as they expand/grow. The growth of various Sectors of the economy affects revenue growth either positively or negatively. We conceptualize that as the sectors of the economy grow, tax revue also grows. Therefore Tax revenue growth is affected by growth of the sectors of the economy.

In the current study, variables such as manufacturing sector, level of income, tax reforms, external sector and real estate sector are expected to affect Tax revenue positively. However the expectation on the agricultural sector on the tax revenue is either positively or negatively depending on either it's the commercial farming or peasantry farming growing respectively.

3.3. Econometric Model

The study uses the Multivariate regression model as the method of estimating the correlation between dependent variable and independent variables and the magnitude of the relationship under the classical linear regression (CLR) assumption. The method will give best-unbiased estimates (BLUE) (Gujarati, 1995**)**. However we will try to establish if autocorrelation, heteroscedasticity and multicollinearity do exist.

The Econometric model will be a linear equation as shown below;

$$\boldsymbol{T = X\beta + \varepsilon}$$

Where;

T represents the outcome variable;

X represents the set of predictor variables in matrix form;

β represents set of coefficients tied to the predictor variables;

ε denotes the error term that explains the residuals

3.4. Empirical Model And Specification

We assume that tax revenue growth is affected by level of income, manufacturing sector, agricultural sector, tax reforms, external sector and the real estate sector. Therefore the Tax revenue is a function of the above variables whose fuction can be in the form

Tg = f (GDP, MS, AS, TR, ES and RES)…….(i)

Equation (i) can be written in a mathematical form as

$T_g = Bo + B_1GDP_g + B_2MS_g \pm B_3AS_g + B_4TR + B_5ES_g + B_6RES_g + E$…….(ii)

Where by

T_g - is Tax revenue growth

B0 – is the constant term

B1 to B6 - are the unknown coefficients parameters related to specific variables to be estimated.

GDP_g – is gross domestic product growth

MS_g - is the manufacturing sector growth

AS_g – is the agricultural sector growth

TR– is the tax reforms

ES_g – is the external sector growth

RES_g – is the real estate sector growth

E - is the error term.

3.4 Definition, Measurement And Signs Of The Variables

Tax revenue growth- This was the dependent variable in the model that was affected by a multiple of independent variables. It was measured in terms of the growth over time.

GDP –This was the total income output of the country. It represents level of income of a country. It was measured in growth terms. It was expected that the level of income would have a positive effect on the dependent variable, that is, income of the country grows; tax revenue resulting from the same also grows.

Manufacturing sector – This is one of the sectors of the economy that deals with processing of products, that is, value addition to products of a country. This sector was measured in terms of the sector growth. Through value addition, indirect taxes increase.

Also the sector involves employing people therefore income levels of people are improved and corporate profits, thus direct taxes increases. Therefore as manufacturing industry grows thus is that tax revenues growth expected and appositive relation is expected.

Agricultural sector – This is the sector of the economy concerned of the farming activities of the economy. It was measured in terms of sector growth. Peasantry farming does not result to any taxable income while commercial farming leads to increased taxable income and improved income to consume other goods which will result to the indirect taxes. Its correlations with tax revenue was expected to take either a negative or positive sign depending on whether it was the peasantry farming growing or commercial farming.

Tax reforms – Tax reforms refers to the change in the way taxes are collected and increasing of the tax bases. TR was measured using dummy variables, where the value 1 represented the year where there was a reform and value 0 for a year in which no reform occurred. The expectation of the TR was that it would have a positive impact on the tax revenue.

External sector – this is the imports and exports of the country. It was measured in terms of net exports growth. As exports of the country grow, levels of taxable income grow thus the tax revenue. On the other hand imports are subjected to various import tariffs thus adding to the tax revenue. This sector is expected to influence the tax revenue positively.

Real estate sector – this is the sector of the economy that is concerned with the residential and commercial properties of a country. It will be measure in terms of growth over time. This can be deduced from the fact as commercial properties grow, both indirect taxes (withholding income tax and VAT) and direct taxes (income tax) grow. When residential properties grow, taxes grow in two ways. Residential properties intended for renting means income tax will grow form growing taxable income and if

owner residential properties grow it mean indirect taxes will grow, that is, by incomes of the professionals involved in the construction of such owner residential properties. The sector's effect on the tax revenue is expected to be positive.

Table 3.1: Variables and Measurement

Variable	Description	Measurement	Expected sign
Dependent Variable			
Tax revenue growth	Dependent variable	growth	
Independent Variables			
Income level/ GDP	Independent variable	growth	Positive(+)
Manufacturing sector	Independent variable	growth	Positive (+)
Agricultural sector	Independent variable	growth	Positive (+) or Negative(-)
Tax reforms	Independent variable	Dummy (1 in the when there was a reform and 0 in the year with no reform)	Positive (+)
External sector	Independent variable	Share of Exports value minus share of imports value growth	Positive(+)
Real estate sector	Independent variable	Growth	Positive(+)

3.5.Estimation Issues and Tests

3.5.1. Stationarity Test

This is a test to detect non-stationarity. A change of estimates over time can lead to spurious estimates. A variable is considered to be stationary when it has a constant mean variance and a covariance between two consecutive periods. Failure to fulfill these conditions implies that a variable is a non-stationary variable or has a unit root. It is

important to establish the status of stationarity of a variable to avoid having spurious results. ADF, PP and ZA were used to detect for non- stationarity.

3.6.2. Autocorrelation

The classical linear regression assumes that there is no relationship among members of series of observations over time. Sometimes such a relationship may exist. To establish if the fitted model in the study fully explains the association between explanatory variables and dependent variables, we will test for autocorrelation. Durbin- Watson d test will be used. Whereby

$d = 2(1-r)$ and $-1 \leq r \leq 1.$, r is the correlation coefficient

If $r = 0$ then $d=2$ and this means there is no autocorrelation and if the value of d differs greatly from 2, then there is serious autocorrelation. This implies that the explanatory variables, however unbiased, are no longer efficient as they no longer have minimum variance.

3.6.3. Multicollinearity

The explanatory variables are collinearly related in this situation where i.e one explanatory variable can be explained by another explanatory variable. This also affects statistical inference of the model estimators but with large sample size, the severity of multicollinearity is reduced. In the presence of multicollinearity we drop one of the correlated variables among pairs with high correlation. VIF was used to test for multicollinearity.

3.7. Type of Data, Sources And Data Analysis

The study utilized secondary data. The data was obtained from statistical abstracts and economic surveys published by the KNBS and covered the period 1984-2017. The data analysis involved computation of descriptive and inferential statistics. The descriptive

statistics served to summarize the data, while the inferential statistics helped in establishing the nature of relationships among the variables of interest.

CHAPTER FOUR

RESULTS, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter shows the data analysis results together with their respective discussions. It contains section 4.2 on descriptive analysis where data is described using graphical analysis and descriptive statistics. Section 4.3 presents the results on the diagnostic tests. Section 4.4 reports the regression results and their respective interpretations and section 4.5 presents a brief discussion of the findings in relation to previous studies.

4.2 Descriptive Analysis

This section describes data in two ways; first using descriptive statistics and second using graphical analysis. Descriptive analysis is important because it helps in understanding features of data prior to any econometric analysis.

4.2.1 Descriptive Statistics

Measures of central tendency and dispersion as descriptive statistics are conducted in this section. The results of the mean, coefficient of variation, minimum and maximum for each variable are contained in Table 4.1.

Table 4.1: Descriptive Statistics

Variable name	N	Mean	C.V	Minimum	Maximum
Tax revenue growth	33	14.0	60%	2.3	45.3
GDP growth	33	14.8	50%	1.5	47.9
Agricultural sector growth	33	2.8	150%	-5.0	11.7
Manufacturing sector growth	33	3.1	90%	-2.3	8.2

Tax reforms	33	0.8	60%	0.0	1.0
External sector growth	33	19.7	820%	-229.9	832.3
Real estate sector growth	33	16.9	140%	-42.8	125.2

Descriptive statistics from Table 4.1 indicates that external sector growth had the highest mean for the 33 years considered (1984-2017). It has a mean of 19.7% followed by 16.9% from the real estate. The average growth rate of GDP over the 34 years was 14.8% while tax revenue grew by 14% on average. The average growth of the manufacturing sector was slightly higher than that of the agricultural sector. They had a 0.3% difference. Tax reforms are a dummy variable with 1 indicating a reform occurred and 0 no reform in a specific year. A mean of 0.8 is approximately 1, meaning that tax reforms occurred on average.

The level of variability across variables is measured by the coefficient of variation (CV). It is basically the ratio of standard deviation to the mean, multiplied by 100%. From Table 4.1 variability was least in tax revenue growth, GDP growth and tax reforms. This means that the growth in these variables was relatively consistent over years. Growth in the agricultural sector varied more than that of the manufacturing sector. This can further be seen from the minimum and maximum values. The agricultural sector has a bigger range than the manufacturing sector. Variability in the real estate sector growth was above 100%, at 140%. The least growth in real estate was a decline of 42.8% in 1999 while the sector had the highest growth in 2010 at 125%. This is because of rebasing of the GDP, which started in 2010. External sector growth had the highest variability meaning that the trade balance varied widely over time. The least growth was in 2005 at -229.9% while the highest growth was in 2006 at 832%.

4.2.2 Graphical Analysis

Graphical analysis portrays time-series features of individual variables. This helps in pre-empting future tests such as unit-root and it directs whether this test should be conducted

with a trend, trend and constant or constant alone**.** Figure 4.1 displays the trend in the variables of interest over the study period.

Figure 4.1: Trend in Variables 1984-2017

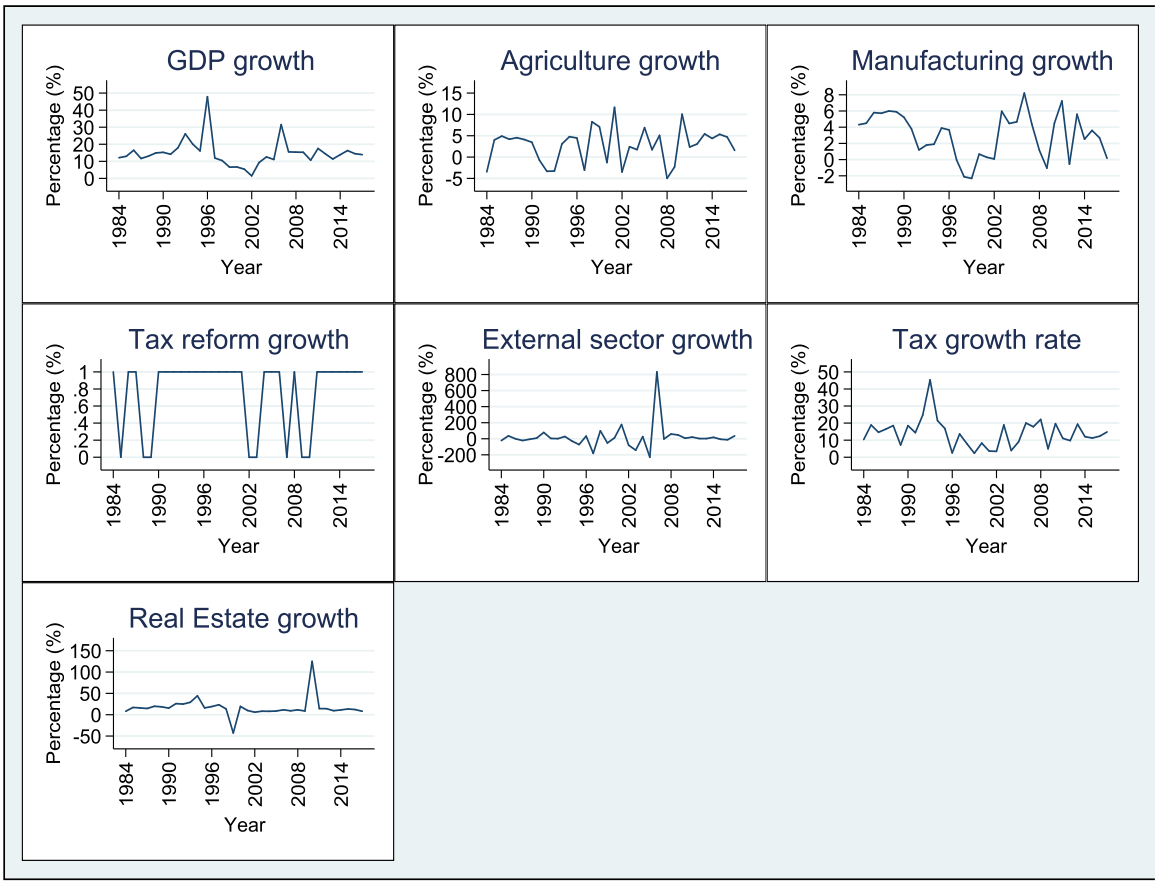


Figure 4.1 contains the graphical plots of each variable. It can be seen that all variables have an almost stable trend. The upward and downward trends for all variables are even across time with a few peaks and lows. This is indicates that variables are likely to be stationary. The peaks and lows for instance in 1993 for tax growth rate arise from structural breaks. Hence, structural breaks are also important to account for in our variables. The presence of unit roots and structural breaks are formally tested in section 4.3.

Looking through the graphs one will notice that the years, at which the independent variables were at the lows, the dependent variable (tax revenue growth) was also at its

low. For instance, manufacturing, agriculture and external trade were low in the years 1997, 2002 and 2007/2008. This is also reflected in the same years of the dependent variable. Keen observation into the years lows; we notice that these were years of elections and post election period filled with fears of election violence. The fear of post election violence or the actual post election violence deeps the economy and this in turn affects our dependent variable, which is tax revenue. Observing the main independent variable (real estate growth), one notices the variability has not been so wide until around the period 2010. This is most likely due to the rebasing and stability of the economy after the 2008 post election violence.

4.3 Pre-estimation Tests

As previously mentioned, an OLS regression model was used to evaluate the objectives of this study. However, prior to conducting the regression analysis, a series of diagnostic tests were performed to make sure that the data collected for this study did not, in any way, violate the assumptions underlying the regression model. In particular, these tests encompassed; stationarity, autocorrelation and multicollinearity test.

4.3.1. Stationarity Test

A variable is considered to be stationary when it has a constant mean variance and a covariance between two consecutive periods. Failure to fulfill these conditions implies that a variable is non-stationary or has a unit root. It is important to establish the status of stationarity of a variable to avoid having spurious results. Therefore, it is important to test for stationarity prior to conducting any estimation. In practice, spurious regressions have a low Durbin-Watson d-statistic and a high R-squared value (Thomas, 1997).

This study applied three approaches to test for stationarity; ADF (the Augmented Dickey-Fuller test), PP (Phillips-Perron test) and ZA (Zivot-Andrews test). The ZA test establishes the presence of both unit root and structural breaks unlike the ADF test and PP test which do not show the structural breaks. Therefore ZA test is used as a confirmatory test for PP and ADF results. Following Figure 4.1, we expect to have

structural breaks in our variables. To make an inference in all tests, the test statistic is compared to the critical value at different levels of significance (1%, 5% and 10%). The null hypothesis is rejected when the absolute value of test statistic is greater than the critical value. However, the study does not reject the null hypothesis and conclude that a unit root exists if the absolute value of the test statistic is less than the critical value. Table 4.2 indicates the optimal level of stationarity for each variable except tax reform growth, which is a dummy variable.

Table 4.2: Stationarity Test Results

Name of Variable	Test	Lag	t-statistic	Inference	Comment
Tax revenue growth	ADF	0	-4.280**	*I(0)*	Stationary at level
	PP	1	-4.269**	*I(0)*	Stationary at level
	ZA	0	-5.898***(1996)	*I(0)*	Stationary at level
GDP growth	ADF	1	-4.551***	*I(0)*	Stationary at level
	PP	1	-4.551***	*I(0)*	Stationary at level
	ZA	0	-4.574**(1994)	*I(0)*	Stationary at level
Agricultural sector growth	ADF	0	-6.630***	*I(0)*	Stationary at level
	PP	0	-6.630***	*I(0)*	Stationary at level
	ZA	0	-6.849***(1993)	*I(0)*	Stationary at level
Manufacturing sector growth	ADF	0	-3.482*	*I(0)*	Stationary at level
	PP	1	-3.478*	*I(0)*	Stationary at level
	ZA	0	-5.535***(2003)	*I(0)*	Stationary at level
External sector growth	ADF	0	-7.431***	*I(0)*	Stationary at level
	PP	1	-7.432***	*I(0)*	Stationary at level
	ZA	0	-7.572***(2008)	*I(0)*	Stationary at level
Real estate sector growth	ADF	0	-5.488***	*I(0)*	Stationary at level
	PP	1	-5.488***	*I(0)*	Stationary at level
	ZA	0	-5.532***(2000)	*I(0)*	Stationary at level

*p<0.05; ***p <0.01

According to Table 4.2, all the variables are stationary at level. ZA test indicates the respective years each variable had a structural break. However, presence of a structural break and unit root are not problems that lead to cointegration among the variables in the study. Therefore, our variables do not have a relationship over time. Based on this, it is appropriate to run an OLS regression model. Prior to conducting an OLS regression analysis, we conduct diagnostic tests to assess the adherence of the model to specific OLS assumptions.

4.3.2 Autocorrelation Test

A key requirement for the application of an OLS regression model in a time-series data is that the data drawn should demonstrate zero autocorrelation. Therefore, to ensure that the results generated from the regression analysis were satisfactory and valid, data covering all the variables of interest in the study were subjected to an autocorrelation test. For the purpose of this study, autocorrelation was detected using the Durbin-Watson d-statistic recommended by Keller (2018). The results of the test are as displayed in Table 4.3

Table 4.3: Autocorrelation Test Results

Durbin-Watson d-statistic (*d*)	1.89
Number of independent variables (*k)*	6
Observations (N)	33

Table 4.3 shows that the Durbin-Watson statistic (*d*) statistic is 1.89 at k=6 and *N*=33. Because the *d*-statistic is less than 2 but its approaching 2, it could be inferred that the data demonstrated positive correlation. However, the variation is not large enough to cause concern. It was, therefore, concluded that the data did not suffer the problem of autocorrelation.

4.3.3 Correlation Analysis

A Pearson correlation analysis was carried out to investigate both the direction and strength of relationship among the variables of interest in this study. This analysis was conducted to make sure that some form of association existed between the variables so that the role of the regression model would be to assess how variations in the predicted variables affected the dependent variable. The results of the analysis are presented in Table 4.4.

Table 4.4: Correlation Matrix

	Tax Reforms	**External Sector**	**Real Estate**	**Agriculture**	**Manufacturing**	**GDP Growth**
Tax Reform	1.00					
External Sector	-0.08	1.00				
Real Estate	0.18	-0.23	1.00			
Agriculture	0.17	-0.49	0.18	1.00		
Manufacturing	0.11	-0.57	0.60	0.24	1.00	
GDP Growth	0.14	-0.34	0.19	0.59	0.78	1.00

As evident in Table 4.4, the results generally indicate that the predictor variables were not strongly correlated amongst themselves. In other words, none of the variables could be flagged as a potential cause of multicollinearity at this juncture. A more robust technique for assessing multicollinearity is described in the next section.

4.3.4 Multicollinearity

Multicollinearity refers to a scenario when two variables are closely related and as a result they have an almost perfect relationship with one another. In addition, it renders the

variance inefficient and thereby leads to errors in conclusions. The VIF (Variance Inflation Factor) is used to detect for multicollinearity in this study. The results of testing for multicollinearity of the study variables using the VIF method are shown in Table 4.5.

Table 4.5: Multicollinearity Test Results

Variable	**VIF**	**1/VIF**
GDP growth	1.38	0.724082
Agricultural sector growth	1.23	0.812374
Manufacturing sector growth	1.22	0.819271
Tax reform	1.19	0.841591
External sector growth	1.13	0.882912
Real estate sector growth	1.07	0.937721
Mean VIF	**1.20**	

As a rule of thumb, multicollinearity is present when the tolerance value is 0.01 or less. Additionally, a VIF greater than 10 is indicative of multicollinearity. Table 4.5 shows that the VIF values for all the predictor variables are less than 10, suggesting that multicollinearity was not present among the variables. The tolerance values for all the independent variables are also far in excess of 0.01, further implying that multicollinearity was not a problem.

4.4 Regression Results

The core objective of this study was to assess the implication of variations in the growth of real estate sector on the growth of tax revenue in Kenya. The study also set out to investigate how the growth in the real estate sector together with growth in GDP, manufacturing, agricultural and external sectors, as well as, tax reforms affect tax revenues. These objectives were tested using an OLS regression model for time-series data and the results are as shown in Table 4.6.

Table 4.6: Regression Results

Source	SS	df	MS Number of obs =	33	
	F(6, 27)	=	46.52		
Model	10313.2432	6	1718.87386 Prob > F	=	0.0000
Residual	21690.0705	27	36.9507163 R-squared	=	0.3223
			Adj R-squared	==	0.3153
Total	32003.3136	33	Std Error of the Estimate	=	6.0787

taxe_revenue_growth	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
agriculture_growth	-.6922238	.0701066	-9.87	0.000	-.8299141	-.5545335
manufacturinggrowth	.9849718	.1164665	8.46	0.000	.75623	1.213714
external_sector_growth	.000864	.0016226	0.53	0.595	-.0023229	.0040509
real_estate_growth	.1179113	.0107726	10.95	0.000	.0967539	.1390688
gdp_growth	.0336091	.0416959	0.81	0.421	-.0482821	.1155004
tax_reform	3.094252	.737328	4.20	0.000	1.64613	4.542374
_constant	7.767497	.8697514	8.93	0.000	6.059294	9.475701

As seen in Table 4.6, the value of the R^2 which denotes how much of variability in the outcome variable could be explained by the combined effect of the predictor variables was 0.32. This has the implication that together with growth in agricultural sector, manufacturing sector, external sector, as well as, growth in GDP, tax reforms and real estate growth accounts for 32.23% of variation in Kenyan tax revenue growth. The ANOVA results (F (6, 27) = 46.52, p<0.05) further show that the OLS regression model was statistically significant in predicting the influence of real estate growth on tax revenue growth in Kenya.

A close inspection of the coefficients column in Table 4.6 reveals a number of key findings. The results show that a 1% growth in agricultural sector would cause a decline

in tax revenue by 0.69%, *ceteris paribus.* This effect is significant as indicated by the *t*-statistic results, $t\,(33) = -9.87$, $p < 0.05$. Keeping all other factors constant, a 1%growth in the manufacturing sector would produce a corresponding increase in tax revenue by 0.98%. The impact of growth in the manufacturing sector is statistically significant as shown by the *t*-statistic results, $t\,(33) = 8.46$, $p < 0.05$. In addition, the results indicate that a 1% growth in the external sector would cause growth in tax revenue to slow down by 0.009%, holding all other factors constant. However, the link between the two variables was not statistically significant as demonstrated by the *t*-statistic results, $t\,(33) = 0.53$. $p > 0.05$.

Table 4.6 also reports that a 1% incremental growth in Kenyan real estate sector would enhance tax revenues by 0.12%, *ceteris paribus.* The nature of this effect is statistically significant as demonstrated by the *t*-statistic results, $t\,(33) = 10.95$, $p < 0.05$. Moreover, the results show that a unit growth in GDP would enhance tax revenue growth by 0.034%, although this relationship is not statistically significant as reflected by the *t* statistic results, $t\,(33) = 0.81$, $p > 0.05$. With respect to tax reforms, a 1% increase in the reforms would improve tax revenues by 3.09%. The effect of tax reforms is statistically significant as shown by $t\,(33) = 4.20$, $p < 0.05$.

4.5 Discussion of the Results

The real estate sector growth as it can be deduced from the results, is significant and positively affects the growth of tax revenue. According to the results, 1% change in real estate growth changes tax revenue growth by 12% positively. Tadele (2015) and Mawejje and Munyambonera (2015) found similar results in their endeavor to examine the effect of real estate the economy on the tax revenue. This indicates that as the sector grows it leads to an increase of profits and income that are taxable directly (PAYE and corporation tax) or income that is taxed indirectly, that is, through consumption of the surplus income from the sector, VAT is paid indirectly

Accordingly, the results show that, 1% change in the GDP growth leads to 0.034% change in tax revenue growth in either way (variables move together). The effect is positive but not statistically significant. Skinner (1996) and Karran (1985) have obtained similar results in their studies.

The growth of the agricultural sector is significant but it has a diminishing effect on tax revenue growth. A 1% growth in the agricultural sector output decreases tax revenue growth by approximately 0.69%. This finding is in line with Stotsky and Woldermariam (1997), Leuthold (1991) and Ghura (1998). This indicates that either taxable output from the sector is minimal and largely subsistence or there is a high tendency of tax evasion for agricultural products and agricultural subsidies that eat into the tax revenue.

The manufacturing sector growth also indicates that a 1% increase in its growth leads to 0.98 % increase in tax revenue growth but its not significant. In reference to the previous studies in our literature reveiew, the simillar results were expected. This is congruent with the finding obtained by Muhammad & Ahmed (2010) where the manufacturing sector was found to have a positive impact on the tax collection.

The regression results further show that whenever tax reforms ar implemented, the tax revenues increases by 3.09%. The coeffecient sign is postive as expected from the literature review. This can be seen in the study by Muriithi & Moyi (2003), who found evidence of a postive impact of ta reforms on the overal tax system and on indivindual tax heads. Smillar results were also reported by the African Economic Research Consortium (1998) and Nyandieka (2012). These results have the implication that tax reforms are good for tax revenue growth because it follows that whenever the government undertakes a tax reform, the pace of tax revenue growth is enhanced.

The regression results shows that, 1% increase in external growth increases tax revenue growth by 0.009%. However, the realationship between the two variables was found to be not statistically significant. This finding partially supports the evidence by Stotsky & Woldermariam (1997) who found that export share of GDP have a positive and

statistically significant impact on tax revenue, but in our case the relationship is not significant.

In general, the effect of variables on tax revenue growth (real estate growth, manufacturing sector growth and tax reform) is positive but and signifcant, Agricultural growth affects taxes Negatively and the relationship is significant while External sector growth shows a positive relationship with tax revenue growth but the relationship is insignificantly.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction

The chapter's discussions revolve around the major findings, conclusion, policy recommendations and areas of further studies on the ground of the research goals. The first goal was determination of the pattern of the real estate sector in Kenya; the second objective was to establish the impact of real estate sector growth on the tax revenue changes in Kenya. The third objective was to suggest policy measures to improve tax productivity from the real estate sector.

5.2 Summary of Findings

The guiding focus of this research was to examine the impact of the growth of the real estate sector on the tax revenue growth in Kenya. This was supplemented by three objectives. Specifically to determine the trend of the real estate sector in Kenya since 1984, to determine the effects of real estate sector growth on the tax revenue changes in Kenya and to suggest policy measures to improve tax productivity from the real Estate sector.

As a result, time-series analysis was conducted using data from 1984 to 2017. The tax revenue growth was used as the dependent variable while independent variables were growth of; GDP, manufacturing sector, agricultural sector, tax reforms, external sector and the real estate sector. Data for each variable was described using descriptive statistics and graphs. Afterwards, a unit root test was conducted to establish stationarity of our variables. Three tests were used; ADF, PP and ZA. The latter test establishes structural breaks and unit roots while ADF and PP only establish unit root. Therefore, the ZA test was used as a confirmatory test for ADF and PP results.

It was established that all the variables were stationary at level and therefore, did not have a relationship over time; Or rather they were not cointegrated. Based on this finding, an OLS regression was deemed the most appropriate. However, prior to applying the regression model, a number of diagnostic tests (multicollinearity, autocorrelation and correlation) were performed. It was found that the data exhibited zero multicollinearity and despite existence of positive autocorrelation, it was considered an issue of too much concern.

The OLS regression model yielded a number of pertinent insights with respect to the study's focus of interest. It emerged that growth in agricultural sector slows down the growth in tax revenue. Additionally, the model revealed that growth in the manufacturing sector and real estate sector, as well as, tax reforms have a positive and significant impact on the growth of tax revenue. Moreover, the results showed that growth in GDP and external sector do not have a significant impact on the growth of tax revenues in Kenya.

5.3 Conclusion

This study set out to uncover whether or not the real estate sector in Kenya has any remarkable contribution to the country's overall revenue. In light of the study's primary interest, the empirical results provided evidence that a positive relationship does exist between growth of Kenya's real estate sector and the country's tax revenue. In other words, the vibrant growth presently being witnessed in the real estate sector does benefit the country in connection to the revenue collected from the sector.

The growth of the real estate, GDP and manufacturing and agricultural sector, tax reform and external sector growth explain about 32% of variations in tax revenue growth. This is according to the R-squared value. In addition, the p-value of the F-statistic for all models is significant. It is worth noting that the R-Squared value is only about 32% because there are many other factors that affects the growth tax revenue that were not included in the model. Such factors includes but not limited to; corruption rates, customs rules, admistrative tax policies training,qaulity and motivation of tax collectors.

As such, it can be concluded that growth in real estate is an essential financial mainstay for the Kenya both at the national and county level. A move to slow the growth of the sector, for instance through punitive taxation, should be clear based off this study's findings, would retard the government's financial ability to meet its tax targets needed to facilitate public services. Moreover, it can be deduced that the future capability of the real estate sector to make significant contribution to Kenya's revenue growth is tied heavily on the weight of taxes imposed on the sector.

5.4 Recommendations

Following the foregoing findings, it is recommended that the right course of path should be devoid of punitive taxation of the real estate sector, if the government wishes to reap benefits off the industry. Instead, the KRA should stand firm it its position of making sure all eligible citizens pay their fair share taxes. In this regard, it is the view of this study that the KRA should enhance its taxpayer compliance activities rather than increase its tax rates for the sector. For instance, KRA should pursue awareness programs and campaigns to encourage and remind citizens to pay their taxes. In the same light, the government should offer tax incentives to property owners so as to encourage voluntary submission of taxes instead of compulsory payment.

Considering the critical role played by the real estate in Kenya in terms of revenue generation it is of essence for policymakers to embark on reforms geared towards removal of barriers that impede the sustainable development of the sector. This is necessary if the Kenyan government still wishes to gain from the industry on a long-term basis. Examples of constraining condition that such reforms should seek to address touch on high cost of accessing finance, high labor costs, costly land prices and oversupply of property.

5.5 Areas of Further Study

This study focused solely on the Kenyan real estate sector. As such, it is important to conduct studies giving more insights with respect to incentives and the kind of

information required by the real estate owners to encourage voluntary tax payments from the sector; this may require collecting primary data. Additionally, this study's focus of interest was Kenya, future researchers should, thus, undertake similar studies to investigate whether the real estate sector of other countries, especially that of the neighboring countries, poses the same impact on tax revenue growth as in Kenya. In this regard, similar studies covering other economic sectors should be conducted in the future. A more broadened range of studies would offer researchers with comprehensive information to facilitate comparison and contrast of the performance of different sectors.

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APPENDICES

Appendix 1: Variable Growths

Year	Agri_growth	Manu growth	Tax_reform	Exter_sec_growth	Tax_rev_growth	real_estate_growth
1984	-3.48	4.31	1	-22.72	10.39	8.1
1985	4.01	4.49	0	36.03	18.9	17.04
1986	4.92	5.8	1	-0.46	14.62	16
1987	4.19	5.72	1	-21.86	16.47	14.63
1988	4.55	6	0	-6.27	18.54	19.87
1989	4.11	5.9	0	8.38	7.17	18.53
1990	3.47	5.23	1	78.1	18.52	15.45
1991	-0.71	3.8	1	4.21	14.41	26.03
1992	-3.33	1.2	1	1.63	24.68	24.95
1993	-3.27	1.8	1	28.12	45.33	29.11
1994	3.08	1.9	1	-28.99	21.48	44.37
1995	4.79	3.9	1	-71.73	16.86	16.01
1996	4.47	3.67	1	33.54	2.55	19.14
1997	-3.07	-0.04	1	-181.73	13.64	23.38
1998	8.29	-2.12	1	99.54	7.89	13.59
1999	7.09	-2.32	1	-52.34	2.34	-42.78
2000	-1.28	0.68	1	10.41	8.28	19.48
2001	11.66	0.29	1	176.96	3.62	9.89
2002	-3.5	0.08	0	-79.63	3.43	5.96
2003	2.43	5.97	0	-142.13	18.93	8.29
2004	1.75	4.46	1	27.16	3.95	8
2005	6.91	4.66	1	-229.91	9.03	8.68
2006	1.73	8.21	1	832.25	20.06	11.55
2007	5.09	4.38	0	-2.8	17.86	9.22
2008	-4.98	1.14	1	59.37	22.15	11.48
2009	-2.3	-1.05	0	47.52	4.96	8.7
2010	10.05	4.5	0	6.94	19.68	125.15
2011	2.36	7.24	1	20.84	11.05	14.37
2012	3.07	-0.56	1	2.5	9.76	14.19
2013	5.44	5.6	1	2.61	19.37	9.49
2014	4.37	2.52	1	18.07	12.04	11.25
2015	5.34	3.6	1	-6.47	11.25	13.52
2016	4.7	2.69	1	-12.59	12.35	12.19
2017	1.57	0.16	1	36.29	14.82	8.12

Appendix 2: Variables Raw Data

Year	GDP (current LCU)	Agri (current LCU)	Manu(current LCU)	Tax_reform	Exter-sector	Real_estate
1983	79,592,200,000	23,773,200,000	8,165,200,000		8,165,200,000	4,977
1984	89,242,600,000	26,335,400,000	9,219,200,000	1	9,219,199,999	5,380
1985	100,811,600,000	28,838,400,000	10,368,000,000	**0**	10,368,000,000	6,297
1986	117,460,200,000	33,802,200,000	12,164,600,000	**1**	12,164,599,999	7,304
1987	131,155,800,000	35,637,200,000	13,049,400,000	**1**	13,049,399,999	8,373
1988	148,283,780,000	37,871,980,000	15,059,200,000	**0**	15,059,200,000	10,037
1989	170,404,100,000	44,243,400,000	17,107,200,000	**0**	17,107,200,000	11,896
1990	196,433,610,000	49,725,466,000	19,748,000,000	**1**	19,747,999,999	13,734
1991	224,230,069,300	54,533,085,100	23,348,060,400	**1**	23,348,060,399	17,309
1992	264,471,872,700	65,539,534,400	24,614,600,000	**1**	24,614,599,999	21,627
1993	333,611,292,400	89,434,560,000	28,393,600,000	**1**	28,393,599,999	27,923
1994	400,657,837,200	112,646,380,000	36,155,200,000	**1**	36,155,199,999	40,313
1995	465,250,740,000	122,591,800,000	38,911,000,000	**1**	38,910,999,999	46,768
1996	687,998,000,000	189,148,000,000	81,593,000,000	**1**	81,592,999,999	55,719
1997	770,313,000,000	213,330,000,000	89,112,000,000	**1**	89,111,999,999	68,747
1998	850,808,200,000	236,056,000,000	92,993,000,000	**1**	92,992,999,999	78,093
1999	906,927,630,000	260,688,000,000	92,004,000,000	**1**	92,003,999,999	44,681
2000	967,836,930,000	277,980,000,000	99,838,000,000	**1**	99,837,999,999	53,386
2001	1,020,221,000,000	284,124,000,000	99,777,000,000	**1**	99,776,999,999	58,667
2002	1,035,373,000,000	267,685,000,000	101,711,000,000	**0**	101,711,000,000	62,165
2003	1,131,782,000,000	292,050,000,000	109,885,000,000	**0**	109,885,000,000	67,316
2004	1,274,329,000,000	317,678,000,000	127,443,000,000	**1**	127,442,999,999	72,702
2005	1,415,725,000,000	343,119,000,000	149,162,000,000	**1**	149,161,999,999	79,015
2006	1,862,041,000,000	382,085,000,000	236,281,000,000	**1**	236,280,999,999	88,145
2007	2,151,349,000,000	442,891,000,000	275,167,000,000	**0**	275,167,000,000	96,273
2008	2,483,058,000,000	551,148,000,000	300,345,000,000	**1**	300,344,999,999	107,323
2009	2,863,688,000,000	668,969,000,000	342,532,000,000	**0**	342,532,000,000	116,657
2010	3,169,335,000,000	786,826,000,000	356,717,000,000	**0**	356,717,000,000	262,654
2011	3,725,918,000,000	980,088,000,000	437,814,000,000	**1**	437,813,999,999	300,406
2012	4,261,370,003,300	1,115,198,412,100	469,103,845,600	**1**	469,103,845,599	343,029
2013	4,745,090,000,000	1,254,760,000,000	506,612,000,000	**1**	506,611,999,999	375,588
2014	5,402,647,000,000	1,483,078,000,000	537,999,000,000	**1**	537,998,999,999	417,829
2015	6,284,185,000,000	1,897,347,000,000	588,896,000,000	**1**	588,895,999,999	474,318
2016	7,194,147,000,000	2,311,863,000,000	653,839,000,000	**1**	653,838,999,999	532,121
2017	8,196,666,000,000	2,838,992,000,000	647,143,000,000	**1**	647,142,999,999	575,347

Appendix 3: Regression Results

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                      (1)
             taxe_reven~h
──────────────────────────────
agricultur~h       -0.692***
                   (-9.87)

manufactur~h        0.985***
                    (8.46)

external_s~h     0.000864
                    (0.53)

real_estat~h        0.118***
                   (10.95)

gdp_growth          0.0336
                    (0.81)

tax_reform           3.094***
                    (4.20)

_cons                7.767***
                    (8.93)
──────────────────────────────
N                      594
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t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

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