

FISCAL POLICY AND EMPLOYMENT ELASTICITIES IN KENYA

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the Requirements for the Award of Doctor of Philosophy Degree in Economics
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DECLARATION

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

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DEDICATION

To my Daughter Trivia Wanjiru Kiguru

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ABBREVIATIONS AND ACRONYMS

AO	Additive Outlier
ARCH	Auto Regressive Conditional Heteroscedasticity
ARDL	Auto Regressive Distributed Lag
ECA	Economic Commission for Africa
COMESA	Common Market for Eastern and Southern Africa
CPI	Consumer Price Index
EAC	East African Community
ECM	Error Correction Model
ERS	Economic Recovery Strategy for Wealth and Employment Creation
FEVD	Forecast Error Variance Decomposition
GCCN	Government Common Core Network
GDP	Gross Domestic Product
GSB	Growing Sustainable Business
ICT	Information and Communications Technology
IEA	Institute of Economic Affairs
ILFS	Integrated Labour Force Survey
ILO	International Labour Organization
IO	Innovative Outlier
ISI	Import Substitution Industrialization
ISIC IV	International Standards Industrial Classification IV
IT	Information Technology
KKV	<i>Kazi Kwa Vijana</i>

KNBS	Kenya National Bureau of Statistics
KPSS	Kwiatkowski-Phillips-Schmidt-Shin
KRA	Kenya Revenue Authority
LR	Likelihood Ratio
MSE	Micro and Small Enterprises
MSME	Micro Small & Medium Enterprises
MTP	Medium Term Plan
NCPB	National Cereals and Produce Board
NEB	National Employment Bureau
NIB	National Irrigation Board
NGO	Non-Governmental Organization
NOFBI	National Optic Fibre Backbone Infrastructure
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
PP	Phillips Peron
PPP	Purchasing Power Parity
SME	Small and Medium Enterprise
TMP	Tax Modernization Programme
UNDP	United Nations Development Programme
VAR	Vector Auto Regression

OPERATIONAL DEFINITION OF TERMS

Additive Outlier Model: Is a structural break model that assumes changes to take place rapidly allowing for a break in the slope.

Employment Elasticity: Is the percentage change in the number of employed persons in an economy associated with a percentage change in economic growth.

Fiscal policy: Is an attempt by government through the use of government expenditure and taxation to affect aggregate demand and aggregate supply in order to achieve desired macro-economic goals.

Formal Employment : Refers to work in which an employee is hired under an established working agreement that includes, salary or wages, health benefits, and defined work hours and workdays.

Innovative Outlier Model: Is a structural break model that assumes changes to take place gradually allowing for a break in both the intercept and the slope.

Priority sectors: Are sectors that make up the bulk of Kenya's GDP and account for approximately half of the country's total formal employment. These sectors include; tourism, agriculture, wholesale and retail, trade, manufacturing, finance, and information and communication.

Public expenditure: This is the amount spent on goods and services, public debt servicing and on capital investment by the government.

Structural breaks: Changes in time series as a result of some unique economic event like changes in economic policies or large economic shocks.

Tax: This is a compulsory contribution to state revenue, levied by the government on workers' income and business profits or added to the cost of some goods, services and transactions.

Vector autoregressive: Is a forecasting technique in economics that does not distinguish between endogenous and exogenous variables but is concerned with the path through time of a vector of variables.

ABSTRACT

Creation of productive and sustainable employment opportunities remains a key policy priority of most countries including Kenya. Employment creation in Kenya has been based on the premise that high economic growth should translate to more employment opportunities. Kenya has experienced varying rates of economic growth. Despite the increase in growth rates, Kenya's employment elasticity declined from 1.28 in 1992-1996 to 0.5 and 0.38 in 2004-2008 and 2009-2016 respectively. The decline in employment elasticity meant that the growth in employment grew by less than the proportionate rate of growth in gross domestic product. Since political independence in 1963, the Kenya government has implemented various fiscal policies that focus on employment creation. Despite all these interventions, creation of adequate, productive and sustainable employment opportunities continues to be one of the greatest economic challenges in the country. The general purpose of the study was to analyze the relationship between fiscal policy and employment elasticities in Kenya. The study estimated the magnitude of employment elasticities in priority sectors in Kenya by employing a log linear regression model. Drivers of employment elasticities were also determined through an auto regressive distributed lag model. The study further analyzed the response of employment elasticities to changes in fiscal policy variables in Kenya by adopting a structural vector auto regressive model. Time series secondary data for the period 1970 to 2016 was used. Empirical findings revealed that employment elasticities within priority sectors ranged from 0.115 to 0.412. The study further found that the drivers of employment elasticity were the first lag of employment elasticity, average wage, inflation rate, labour force participation rate, population density, foreign direct investment and exchange rate. Finally, the study established that taxation, debt, recurrent expenditure and development expenditure had positive effects on employment elasticity while budget deficit had mixed effects on employment elasticity. From the foregoing, it can be concluded that the employment elasticity's response to fiscal policies varied among the priority sectors. The study recommends that government should give more attention to service sectors as a means of enhancing employment creation. Policies pursued by the government to boost employment should also be sector specific. This could be achieved by ensuring that growth targets on employment under the *Kenya Vision 2030*, or any programme are employment-intensive. The study further recommends that policy measures to control inflation should be tightened and more efforts to attract foreign direct investment to be undertaken. Finally, the government ought to pursue prudent expansionary policies that will boost expenditure. This could be realized by eliminating unproductive expenditures and focus on projects and programme that are more productive capable of generating more employment opportunities.

CHAPTER ONE

INTRODUCTION

1.1 Background

Fiscal policy plays an important role in influencing the economic direction of any country. Fiscal policy affects aggregate demand, distribution of wealth, employment levels and economy's capacity to produce goods and services (Rena & Kefela, 2011). According to Siyan and Adebayo (2005), one of the most challenging issues faced by developing countries is rapid increase in labour force, which creates pressure for creation of employment opportunities. Monacelli, Perotti and Trigari (2010) noted that many macroeconomists are in agreement that expansionary fiscal policies stimulates employment.

Before 1930, an approach of limited government, or laissez-faire, prevailed (Horton & Ganainy, 2009). The approach was a doctrine of political economy, which called on countries to scale down the size and functions of government so as to allow markets and the private sector to take on an enhanced role in the allocation of goods and services. The Great Depression (1929-1939) formed the genesis of fiscal policy after an economic downturn of the western industrialized world (Margo, 1988). Between the peak and the trough of the economic recession (1929-1939), industrial production in the United States (US) declined by 47 per cent and real gross domestic product (GDP) fell by 30 per cent (Margo, 1988). Margo (1988) also reported that unemployment rate reached a high of 25 per cent in the US in 1933. The depression caused prices to drop for African produced commodities. In South

Africa, for instance, corn exports declined by 80 per cent while several mine factories and small enterprises closed down. The depression also led to a cut on wages and benefits to workers. This led to radicalization of both worker's unions and nationalist political movements in South Africa (Margo, 1988).

Keynes (1936) offered a theory of depression that asserted that the market mechanism could not be relied upon to spontaneously rebound economies from a slump. Keynes (1936) advocated for public spending to stimulate demand. According to the doctrine, increased demand would in turn increase economic activities and expand employment opportunities. The Keynesian approach to economics remained the mainstream theory until the end of the 1960s, when it was challenged by Friedman and the monetarists, and subsequently replaced by new classical macroeconomics (Stein, 1982). According to Hemming, Kell and Mahfouz (2002) during the 1980s and 1990s discussions of fiscal policy focused mainly on high fiscal deficits and government debt as a source of inflation and balance of payment. The discussions also focused on the contribution of fiscal adjustments to stabilization programmes to address such problems.

Majority of African countries became independent in the early 1960s. African leaders adopted strategies that focused on industrialization as the engine of economic growth (Heidhus & Obare, 2011). To reduce the countries' dependency on manufactured imports, state-driven developments through Import-Substitution Industrialization (ISI) were promoted (Acemoglu, Johnson & Robinson, 2001). Guided by this approach and with support from development partners, governments

invested in large state-run basic industries, and enacted comprehensive regulations to control prices, restrict trade, and allocate credit and foreign exchange (Owusu, 2003). As a result, major investments were made in infrastructure, health and education. Annual economic growth in Sub-Saharan Africa averaged 3.4 per cent between 1961 and 1980 (Heidhus & Obare, 2011). Agriculture recorded an average growth rate of 3 per cent per year over the same period. North African countries experienced high output growth in the 1960s and 1970s but largely stagnated in the 1980s (Heidhus & Obare, 2011).

In the early 1970s, output growth in African countries began to slow down and by the mid-1970s, Africa's economic growth was lagging behind that of other parts of the developing world (Heidhus & Obare, 2011). These developments led to high budget and balance of payments deficits (Heidhues, Atsain, Nyangito, Padilla, Ghersian & Vallee, 2004). According to UNDP (2012), investment rate in Africa declined to 8.5 per cent from 1975 to 1980. This was in comparison to 20-25 per cent investment rates for the average-performing Organization for Economic Co-operation and Development (OECD) countries. This growth was also different for East Asian economies that grew by 30 per cent. Africa's population increased from about 257 million in 1960 to 482 million by 1980 and around 682 million in 1993 (UNDP, 2015). The rapidly growing population was, however, confronted with a much slower rate of increase in employment.

In reacting to the crisis, African leaders and the World Bank recommended different remedies to reverse the negative trends in the growth output and employment. The Lagos Plan of Action [(LPA) 1980- 2000] was borne out of necessity to establish

an African social and economic order based on full utilization of Africa's resources and building of self-reliant economies (Adedeji, 2002). The LPA also entailed the expansion of the public sector as an essential element of development (Heidhues & Obare, 2011). In adopting the LPA, it was recognized that national governments were to be responsible for implementing the fiscal policy strategies in their respective development plans. However, according to Heidhues and Obare (2011) the countries that pursued the LPA like Algeria, Burkina Faso and Sudan ran into numerous difficulties. Some of the difficulties included inefficient industries, bloated public sector and unfulfilled promises by global development partners. As a result, the African countries continued to experience low levels of economic growth, high rate of unemployment and underemployment. This was primarily due to institutional weaknesses of African states.

Arising from the relative failures of the LPA, the structural adjustment programmes (SAPs) were initiated by the World Bank, the International Monetary Fund (IMF) and development partners mainly from the west (Heidhues & Obare, 2011). The SAPs were introduced across Africa in the 1980s and continued to operate throughout the 1990s (Heidhues & Obare, 2011). Adoption of the SAPs was aimed at restoring efficiency in all sectors of the economies and consequently raising the rate of economic growth. The SAPs consisted of a set of fiscal policies designed to generate rapid and sustainable economic growth with macroeconomic stability (Heidhues & Obare, 2011). Implementation of SAPs thus involved the liberalization of prices and marketing systems; financial sector policy reforms; international trade regulation reforms; government budget rationalization;

privatization of parastatals and civil service reforms (Heidhues & Obare, 2011). The impact of SAPs on Africa remains a matter of intense debate. Many empirical studies have concluded that with some exceptions for Ghana and Uganda, SAPs typically had a negligible effect on employment growth in Africa (Mosley, Harringam, & Toye, 1995).

Islam (2004) observed that countries, which succeeded in increasing employment opportunities recognized the importance of sustained high rates of economic growth. The nexus between output growth and employment impact of fiscal policies has, however, resulted in varying outcomes (Batini, Callegari, & Melina, 2012). Some studies found short-term spending multipliers to be higher than revenue multipliers, while others concluded the opposite (Lee, 2000; Baker & Schmitt 1999; Padalino & Vivarelli, 1994; Erber, 1994). In advanced economies, for example, tax-based policies appeared to be associated with adverse effect on jobs. In emerging and developing economies, where the emphasis of fiscal policy was based on sustained growth and economic development, expenditure-based policies seemed costlier in terms of employment than revenue-based policies (Lee, 2000). The reason was that, given spending rigidities and relatively low levels of public outlays, spending-based policies in these economies fell disproportionately on capital and other productive public services (Gali, Lopez, Salido, & Valles, 2009).

Expanding employment opportunities is one of the major goals of economic policy. Employment elasticities provide a numerical measure of how employment growth

varies with growth in economic output (Kon, 2007). Employment elasticity also provide insight into trends in labour productivity and employment generation. It also assists in detecting and analyzing structural changes in employment over time (Kapsos, 2005). According to Schmid (2008), the type of economic growth (extensive or intensive), is an important factor that determines the rhythm of job creation in relation to economic growth.

The International Labour Organization (ILO) came up with Employment Policy Convention (No. 122) in 1964. The Convention obliged member countries to report on action taken to bring about full employment (Richards, 2001). The Employment Policy Convention was based on the belief that stimulating economic growth and development would raise standards of living, meet manpower requirements and overcome unemployment and underemployment. Each member country was to declare and pursue an active policy designed to promote full, productive and freely chosen employment (Richards, 2001). The said policy took account of the stage and level of economic development and the mutual relationships between employment objectives and other economic and social objectives of different countries (Richards, 2001).

According to Richards (2001), the Employment Policy Convention led to worsening of wage distribution in a number of industrialized countries. This was due to weakening of the labour market institutions and the inflexibility to expand high quality education and training systems. Another outcome was that market

liberalization lowered working conditions, especially in poor countries. The employment policy, however, had mixed results. This was mainly because the ILO and member countries, in particular, failed to identify an economic and social strategy that would steer the achievement of the desirable state of full employment. The sub optimal performance was due to economic differences among the developing, industrialized and transition countries.

Creation of productive and sustainable employment opportunities remains a key policy of ILO and also a policy priority for respective governments, including Kenya. In Africa, ILO's policy focal point was the Decent Work Agenda in Africa (2007-2015). One of the major objectives of this agenda was the recognition of the importance of employment creation and enterprise development as central to sustained economic growth and poverty reduction through increased opportunities for decent work (ILO, 2007). However individual countries were to adopt different strategies to achieve this agenda.

1.1.1 Fiscal Policy and Employment in Kenya

The government of Kenya has undertaken a variety of actions to enhance creation of employment opportunities. In the Development Plan (1964-1970), the government aimed to increase employment through fiscal policies that targeted growth oriented development strategy, high wage policy, Kenyanization Programme and the Tripartite agreements of 1964 (Republic of Kenya, 1974). Under the Tripartite Agreement, the government and the private sector employers undertook to increase employment by 15 and 10 per cent, respectively while the

trade unions were to observe a wage restraint for a year. The trade unions were also to observe industrial action free period (Republic of Kenya, 1969).

During the period 1964/65 and 1970/71, recurrent revenues of the government grew at over 16 per cent a year, while recurrent expenditures grew at only 10 per cent (Republic of Kenya, 1974). Tax revenues also increased from 16 per cent of GDP in 1964/65 to 23 per cent in 1971/72. This increase was achieved by progressively raising the average burden of all taxes, except for import duties. Ghai (1968) observed that the rate of increase in employment during the period was low in relation to output growth and employment projections. While real output increased at an annual rate of 6.3 per cent between 1964 and 1969, enumerated employment grew at a rate of 3.5 per cent compared to a projected rate of 5.8 per cent per annum. The implication is that the rate of growth in employment did not match the rate of growth of the economy. This reflects low employment elasticity.

The Development Plan (1966-1970) acknowledged that the country's economic growth rate had been impressive, growing at an annual average rate of about 7 per cent from 1963 to 1966. The Plan thus recommended attention to fiscal policies that focused on restructuring of growth particularly towards agriculture and factor price changes (Republic of Kenya, 1967). It was envisaged that these two measures could go a long way in enhancing employment creation (Republic of Kenya, 1972). The Plan identified foreign investment and adoption of foreign technology as the factors, which would have a bearing on the factor proportions. The Plan also advocated for the replacement of capital-intensive techniques by labour-intensive techniques of production. The government was also to put more resources into

labour-intensive sectors like the road schemes and to invest in training to enhance productivity and employability of labour.

Another strategy of increasing jobs proposed in the Plan was to use fiscal policy measure such as tax system to encourage a full utilization of existing industrial capacity (Republic of Kenya, 1972). Over the Plan period, GDP growth rate averaged 6.4 per cent while the total wage employment rose by 46,000 which was short of the Development Plan target of 70,000 new jobs annually (Republic of Kenya, 1972). This was a reflection of low employment elasticity compared to output growth.

Sessional Paper No. 10 of 1973 on Employment acknowledged that creation of more jobs could only be achieved by a sustained high rate of growth in the economy (Republic of Kenya, 1973). The Sessional Paper ran concurrently with the Development Plan of 1974-1978 and envisioned sustaining the rate of growth in GDP at 7 per cent per year from 1974 up to 1980, a growth rate of 6 per cent per annum for agriculture and 8 - 9 per cent growth for non-agricultural industries (Republic of Kenya, 1973). It also entailed the development of infrastructure and other amenities, rural works programme, Tripartite Agreements (1979) and the promotion of informal and *jua kali* sector as a way of creating employment (Omolo, 2010). During the Plan period 1974-1978, there was only 1 per cent increase in the numbers employed, well below the Plan target growth of 4.5 per cent. This was compared to the average GDP growth of 4.7 per cent per year (Republic of Kenya, 1974; 1975; 1977; 1978). This revealed a low employment elasticity.

Sessional Paper No. 2 of 1985 on Unemployment identified the major causes of unemployment in Kenya as rapid growth of the labour force, low economic growth rate, job selectiveness, seasonality of some industries and skills imbalance (Omolo, 2012). Other causes of unemployment were identified as inappropriate technology and failure of development programme to focus on areas with greater employment potential (Omolo, 2012). The policy paper proposed fiscal policies that were aimed at achieving a high growth rate of 6 per cent per annum through increases in agricultural productivity, support measures in favour of the small enterprises sector and a competitive industrial sector.

The policy paper departed from previous development strategies by shifting away from heavy dependence on import substitution and advocated for decentralization through District Focus for Rural Development. In terms of outcome, the Sessional Paper No. 2 of 1985 realized a decreasing importance of formal sector employment and growing significance of informal sector employment. The employment growth in the informal sector rose from 9.72 per cent in 1986 to 130.37 per cent in 1991. According to Omolo (2010), the high growth in the informal sector was due to the liberalization policies that escalated in 1990s and the negative impact of SAPS that resulted in the switching of workers from formal to informal sector. The formal sector employment growth averaged 3.38 per cent for the period 1986 to 1991, while GDP averaged a growth rate of 4.9 per cent, respectively (Omolo, 2010).

The government formulated Sessional Paper No. 2 on Small Enterprises and Jua Kali Development in 1992. The Sessional Paper led to a policy framework that provided a balanced focus to Small and Medium Enterprises (SME) development

in line with the national goals of fostering growth, employment creation, income generation, poverty reduction and industrialization (Republic of Kenya, 2002). The proposed policies were to be achieved through donor-supported programmes. The services provided by the government included product development, market support, training, microfinance and technical skills upgrading. However, according to Ronge, Ndirangu, and Nyangito, (2002), the policy interventions had minimal impact on employment creation due to lack of strategies for policy implementation and lack of strict monitoring and control of the implementation process.

The Development Plan of 1994-1996 focused on poverty reduction and employment creation in the rural economy by targeting agriculture and urban informal sector (Republic of Kenya, 1994). The Plan proposed to avert growth in unemployment through fiscal policy measures such as diversifying the export base; expanding small-holder agricultural production and micro and small enterprises (MSE); improving infrastructure; and incorporating the SME Programme fully into the overall export promotion strategy (Republic of Kenya, 1994).

The Development Plan of 1994-1996 was followed by the Development Plan of 1997-2001 that focused on rapid industrialization for sustainable development, promotion of MSEs and the liberalization of the labour market (Republic of Kenya, 2001). The results showed that formal employment grew by an average of 1.61 per cent per year between 1994 and 2001. Informal sector employment grew at an average of 13.98 per cent during the same period. These outcomes revealed that employment creation interventions implemented by the country facilitated growth

in informal sector employment more than it did to formal sector jobs. Omolo (2010) noted that this period coincided with the time when the Kenyan labour market started suffering formal sector employment losses triggered by liberalization policies, and the promotion of growth and development of the informal and *jua kali* sector.

The Economic Recovery Strategy for Wealth and Employment Creation (ERS, 2003-2007), was adopted in 2003. The central focus of the ERS (2003-2007) was job creation through sound macroeconomic policies, improved governance, efficient public service delivery, and public investments and policies that aimed at reducing the cost of doing business (Republic of Kenya, 2003).

In addition, the government was to modernize tax administration infrastructure of Kenya Revenue Authority (KRA) in order to strengthen its capacity to enforce tax collection and expand the tax base to target the informal sector. As a result of these strategies, Kenya's economic growth improved from 0.5 per cent in 2002 to 2.9 per cent in 2003, reaching a high of 7 per cent in 2007. During the same period, the economy created 466,000 jobs in 2003, 449,000 jobs in 2005 and 475,000 jobs in 2007 (Republic of Kenya, 2008). The number of jobs created was low compared to the target of 500,000 jobs per year for the entire plan period. The failure of the economy to meet the employment targets meant that the employment elasticity was low compared to the level of output growth since the employment projections were pegged on the economy's performance.

The First Medium Term Plan (MTPI, 2008-2012) constituted the first phase in the implementation of the *Kenya Vision 2030*. The MTPI (2008-2012) targeted to achieve an economic growth rate of 10 per cent by 2012 (Republic of Kenya, 2008). The MTPI (2008-2012) also focused on improving and modernizing Kenya's infrastructure and increasing the share of manufacturing and industry in GDP. The MTP I (2008-2012) objectives targeted six priority sectors; tourism, agriculture, wholesale and retail trade, manufacturing, information technology enabled services (ITES) and financial sector. The MTP I (2008-2012) had projected an annual average employment growth of 6.0 per cent and creation of a total of 3.7 million new jobs within the five-year period. A total of 2.7 million new additional jobs were created during the MTP I (2008-2012) period (Republic of Kenya, 2015). Moreover, about 80 per cent of the new jobs created were in the informal sector. According to Omolo (2010), jobs in the informal sector are precarious in nature with manifestations of low pay, job insecurity, poor safety and health standards and absence of worker rights and representation, among others. Over the period, the rate of economic growth averaged 4.7 per cent except for 2008 when the economy grew by only 1.5 per cent while employment growth rate averaged 4.14 per cent (Republic of Kenya, 2015). This points out the country's low employment elasticity.

The overall objective of the *Kenya Vision 2030* was to be achieved through growth in priority sectors. The MTP I (2008-2012) set specific growth targets on the key priority sectors that were to be met through an expansionary fiscal policy and injection of Kshs. 500 billion (Republic of Kenya, 2008). Specifically, the

agriculture sector was expected to grow at a pace of about 6-8 per cent. This was to be achieved through reduction in the cost of farm inputs and improving farm prices; providing higher value addition; improved marketing and establishment of five disease-free zones to improve the health and quality of livestock.

The target for the tourism sector was to increase the national earnings by increasing international arrivals from 1.6 million to 3 million persons. Both manufacturing and wholesale sectors were expected to grow from 5 per cent to 10 – 12 per cent by 2012. This was to be achieved by setting up two special economic clusters in Mombasa and Kisumu for manufacturing establishments in addition to five SMEs, Industrial Parks and specialized economic zones. The Information Communication and Technology (ICT) and Business Process Offshoring (BPO) sector was expected to create an additional 7,500 jobs and to increase its contribution to GDP by Kshs. 10 billion through the establishments of a BPO park and digital villages (Republic of Kenya, 2008). Despite some achievements made during MTP I (2008-2012), most of the targets set were not achieved over the Plan period leading to revised targets under the Second Medium Term Plan (MTP II, 2013-2017).

The MTP II (2013-2017) outlined the policies, programme and projects that the government intended to implement during the five-year period between 2013 and 2017. The government aimed to deliver accelerated and inclusive economic growth, higher living standards, increased job creation, commercialized agriculture and improved manufacturing (Republic of Kenya, 2013a). The government was to realize these goals by strengthening economic competitiveness. The government was to implement fiscal policy measures such as increased public spending to

expand and modernize the railways, roads, ports, airports, energy, water and the ICT sector. The government was to also devote more investment to infrastructure and to the key sectors of the economy that would drive growth particularly through public private partnership arrangements (Republic of Kenya, 2013a).

Under the MTP II (2013-2017), the target for the tourism sector was to double the number of tourists from an average of 1.5 million to 3 million persons each year and turn the country into a top 10 long haul tourist destination in the world. This was to be achieved through growth and diversification of tourist sources. In the agriculture and livestock sector, the government was to increase the acreage under irrigation to 404,800 hectares so as to reduce the country's dependence on rain fed agriculture. The government envisaged to strengthen economic partnerships with East Africa and the rest of Africa so as to promote trade. The manufacturing sector was to be diversified so as to increase the sector's contribution to the GDP and foreign exchange earnings.

The government also aimed to develop digital content, promote e-government services and encourage the establishment of more ICT based industries. Growth in BPO sector was deemed critical to the MTP II (2013-2017) since the sector had the potential to create job opportunities in large numbers while contributing strongly to the overall GDP growth. Under MTP II (2013-2017), oil and other mineral resources was created as a new priority sector. The government was to develop policy, legal, and institutional framework for the exploitation and management of Kenya's natural resources during the MTP II (2013-2017) period (Republic of Kenya, 2015).

During MTP II (2013-2017), the government targeted to create 1 million new jobs annually and also improve skills training. The government was also to seek a shift towards formal employment, with the aim of increasing the proportion of modern sector employment from 12 per cent in 2012 to 40 per cent by the end of the Plan period. This was expected to increase the share of quality jobs created in the formal sector and put the economy on a high growth trajectory (Republic of Kenya, 2015).

Other fiscal policy interventions that were meant to increase job opportunities in MTP II (2013-2017) included the development and implementation of youth targeted employment programme, development of MSEs, strengthening linkages between industry and training institutions, and the promotion of internship and industrial attachment. The MTP II (2013-2017) also undertook a National Labour Force Survey in order to provide up to date data to address the country's unemployment challenge. It also intended to develop a Sessional Paper on national industrial training and attachment. The total number of new jobs created in the economy rose from 665,800 in 2012 to 735,900 new jobs in 2013. In 2014, total new jobs created were 799,700 compared to the MTP II (2013-2017) target of 821,000 new jobs.

The new jobs created in the formal sector constituted 13.29 per cent of the total new jobs. This was against the MTP II target of 20 per cent. According to Republic of Kenya (2015), the total number of new jobs generated in the economy increased by 4.9 per cent in 2015 to 841, 600 of which 128,000 jobs were in the modern sector and 713,600 were in the informal sector. For the same year, Kenya's GDP expanded

by 5.6 per cent in 2015 compared to 5.3 per cent in 2014. Despite the policy interventions by the government, the rate of growth in employment was low compared to the rate of economic growth. This points to the country's low employment elasticity.

The government intends to create 1.3 million new jobs annually under MTP III (2018-2022) Plan period. To achieve these targets, the government aims to support MSMEs; facilitate establishment of Special Economic Zones (SEZ) and industrial parks; support skills training and internship programme for the youth; and initiate labour intensive public works Programme. Specifically, the government aims to support the MSME sector by improving the enabling environment including implementation of the national credit guarantee scheme to facilitate access to affordable credit (Republic of Kenya, 2018). The MSMEs will also be supported through development of skills and explicit linkages to domestic and external opportunities.

Under the agriculture and livestock sector, the government wants to make agri-business a source of mass employment. This will be achieved by creating sustainable and gainful self-employment for the youth and women through their participatory engagement in agriculture. The government also intends to offer incentives for integration of youth and women into agri-business value chains. These incentives will include market guarantees, incubation training and scholarships for 340 youth in agri-business to produce high value horticultural crops (Republic of Kenya, 2018).

The sectoral targets in the manufacturing sector under MTP III (2018-2022) are to increase the sector's contribution to the GDP from 9.2 per cent in 2016 to 15 per cent by 2022; create additional one million jobs yearly; increase level of foreign direct investments to \$2 billion; and improve ease of doing business. These measures will play a key role in the country's economic growth and development by facilitating employment creation. In the tourism sector, the targets are to increase tourist arrivals from 1.3 million in 2016 to 2.5 million visitors in 2022, increase tourism earnings from Ksh.99.7 billion in 2016 to Ksh.175 billion in 2022, and increase bed-nights by domestic tourists from 3.5 million in 2016 to 6.5 million by 2022 (Republic of Kenya, 2018). In return, these measures are intended to spur economic growth and contribute 9.2 per cent of the total employment per annum over the medium term period.

Due to the immense forward and backward linkages of the wholesale and retail sector with the other sectors of the economy, the sector is targeted to contribute towards the attainment of the envisioned 10 per cent GDP growth rate in the Vision 2030. This will in turn stimulate economic growth and development and create employment opportunities (Republic of Kenya, 2018). This will be achieved under MTP III (2018-2022) through structural transformation of the economy by increasing the share of exports to the GDP. The MTP III (2018-2022) also targets to create over 1 million online jobs over the Plan period for the youths through the Ajira digital Programme and the establishment of the Konza Techno Polis City. The Konza Techno Polis City will be an innovation ecosystem contributing to Kenya's knowledge based economy while Ajira Programme involves provision of

infrastructure, training youth on basic BPO/ITES skills and connecting them to secure online jobs. (Republic of Kenya, 2018)

1.1.2 Employment Elasticity

Kenya's employment creation strategies have been premised on economic growth. According to Omolo (2010), the government's aspiration has been that long-term and sustained high rates of economic growth would facilitate generation of employment opportunities at rates higher than the proportionate increase in the labour force. The genesis of employment elasticities can be traced to the Okun's Law of 1963. Employment elasticity represents a way of summarizing employment intensity of economic growth. Okun (1963) found that a one per cent increase in Gross National Product (GNP) corresponded to a 0.3 percentage point decrease in unemployment rate. This co-movement between output and unemployment results from the fact that variations in output trigger firms to hire and fire workers, causing changes in employment (Ball, Leigh, and Loungani, 2013). Theoretically, Okun's law gives the link between the aggregate supply curve and the Phillips curve while empirically, the coefficient reflects the degree of adjustment of employment to changes in output. Table 1.1 shows employment elasticities and economic growth rates for the world and parts of Africa for the period 1992-2015.

Table 1.1: World and Regional Estimates of Employment Elasticities (1992-2015)

Period/ Region	Employment Elasticities						Average Annual Growth Rate					
	1992 - 1996	1997 - 2000	2001 - 2004	2005 - 2008	2009 - 2012	2013 - 2015	1992 - 1996	1997 - 2000	2001 - 2004	2005 - 2008	2009 - 2012	2013 - 2015
World	0.3	0.4	0.3	0.3	0.3	0.3	3.1	3.7	3.3	4.4	1.7	3.3
European Union	0.3	0.3	0.2	0.5	0.2	0.5	2.4	3.3	1.9	2.2	0.4	0.9
North Africa	0.8	0.6	0.8	0.7	0.5	0.4	2.3	4.3	4.3	5.6	4.4	4.6
Sub Saharan Africa	0.7	0.7	0.5	0.5	0.3	0.4	2.9	3.0	6.0	6.1	4.0	4.4
East Africa	0.6	0.8	0.8	0.6	0.5	0.4	1.9	3	4.9	6.2	3.8	5.7

Source of Data: Omolo (2010), ILO (2011; 2012; 2013; 2014; 2015)

Table 1.1 shows that the global employment elasticity ranged between 0.3 and 0.4 during the period 1992 to 2015. This means that for every one percentage point of additional GDP growth, total world employment grew by 0.3-0.4 percentage points. The employment elasticities for Sub-Saharan Africa ranged between 0.3 and 0.7 over the same period. The employment elasticity for East Africa varied between 0.4 and 0.8 in 1992 - 2015 while the average annual growth rate ranged between 1.9 per cent and 6.2 per cent. Kenya's employment elasticity declined from 1.28 in 1992-1996 to 0.5 in 2004-2008 (Omolo, 2012). However, the decline in Kenya's employment elasticity happened at a time when the country was experiencing high economic growth. Real GDP growth in Kenya increased on an annual basis from 0.3 per cent in 2002 to almost 7 per cent in 2007 (Republic of Kenya, 2008). This growth was at par with growth in sub-Saharan Africa and slightly above the global growth rate of 5.4 per cent at that time (ILO, 2013). Figure 1.1 shows the trend of

growth in formal and informal employment and the GDP growth rates in Kenya for the period 1972 to 2015.

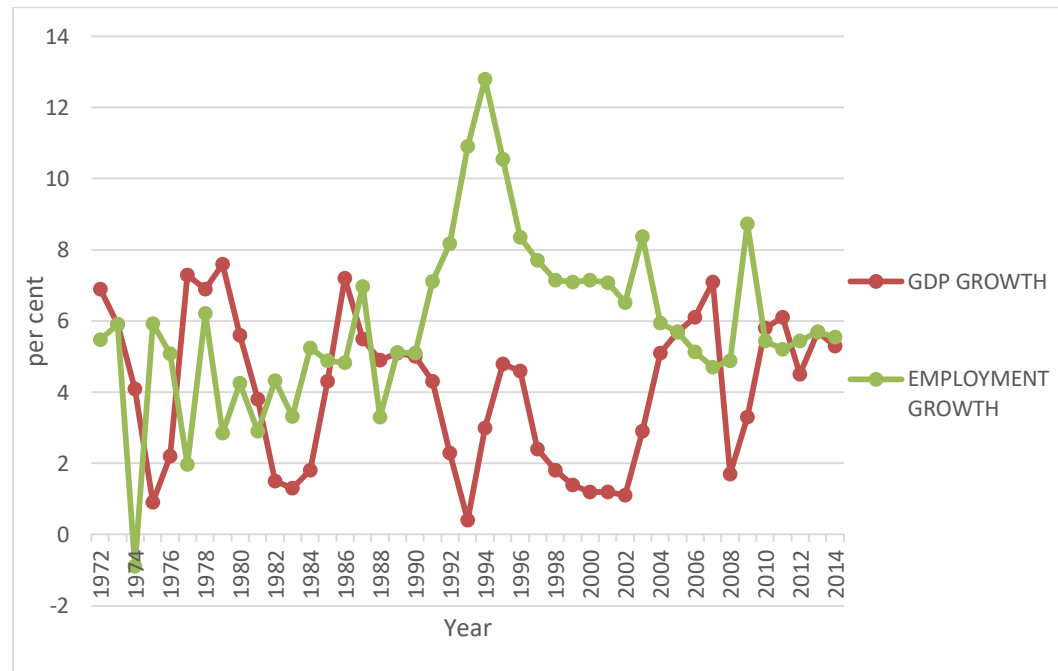


Figure 1.1: Trends in GDP and Employment Growth in Kenya

Source of Data: Republic of Kenya, Economic Survey (various)

Figure 1.1 shows that economic growth rates have been at variance with the employment growth in Kenya. The sharp growth in employment for the period 1991-1995 could be explained by liberalization policies and renewed government strategy towards promotion of growth and development of the informal sector. The informal sector employment grew by an average of 42 per cent between 1991 and 1995. The growth rate in the informal sector employment was high compared to an average growth of 10.9 per cent for the period 1986-1990. Figure 1.1 also indicates a decline in employment growth between 2004 and 2008 while GDP growth was on an upward trend for the same period. Between 2009 and 2014, both GDP and

employment were on an upward growth trend although the growth rate in GDP was higher than the rate of growth in employment. The trends depicted in Figure 1.1 shows that growth rate in employment are not always in tandem with the growth in GDP.

An employment elasticity value of one implies that for every one percentage point of GDP growth is associated with a 1 percentage point increase in employment. However, Islam (2004) argued that both the growth of employment and rising productivity contribute to economic growth. For a given amount of output growth, any increase in the rate of employment growth must be related to an equal and opposite decrease in labour productivity growth. Table 1.2 gives the relationship between employment elasticity, employment growth and productivity growth.

Table 1.2: Employment Elasticities and Productivity Nexus

Employment Elasticity	GDP Growth	
	Positive GDP growth	Negative GDP Growth
$\varepsilon < 0$	(-) Employment growth (+) Productivity growth	(+) Employment growth (-) Productivity growth
$0 \leq \varepsilon \leq 1$	(+) Employment growth (+) Productivity growth	(-) Employment growth (-) Productivity growth
$\varepsilon > 0$	(+) Employment growth (-) Productivity growth	(+) Employment growth (-) Productivity growth

Source: Kapsos (2005)

Table 1.2 shows that in economies with positive GDP growth, negative employment elasticities correspond with negative employment growth and positive productivity growth. For the economies with positive GDP growth, employment

elasticities between 0 and 1 correspond with positive employment and productivity growth and higher elasticities within this range correspond to more employment-intensive (lower productivity) growth. In the economies with positive GDP growth, elasticities greater than 1 correspond with positive employment growth and negative productivity growth. The interpretation of employment elasticities vis-à-vis employment growth and productivity growth is exactly the opposite in cases in which the corresponding GDP growth rate is negative. The ideal situation for any country Kenya included is that in economies with positive GDP growth, an employment elasticity between 0 and 1 should correspond with positive employment and productivity growth

According to Slimane (2015), employment elasticity estimates vary considerably across countries and tend to be higher in the more advanced and closed countries. Countries with a higher share of urban population are also characterized by larger employment elasticities. Khan (2001) asserted that employment elasticities in developing economies should ideally be around 0.7 until these economies attain upper-middle-income status. Khan (2001) also argued that the economies with abundant labour and especially those with relatively high incidences of poverty need to achieve relatively higher employment elasticities to the less labour abundant economies. According to the Republic of Kenya (2015), Kenya is faced by a working poor population estimated at 46 per cent of the employed and a rapid population growth. Coupled with the declining employment elasticities in the

country, there is need for an assessment of the effects of fiscal policy on the employment elasticities in the country.

1.2 Statement of the Problem

The Kenyan government recognizes creation of productive and sustainable employment as part and parcel of the basic policies for economic growth and development (Omolo, 2010). In Kenya, the rate of growth in employment has not been consistent with the rate of growth in the economy. Kenya's employment elasticity has also been declining overtime. The relationship between output growth and employment elasticities is of intense debate among many economists (Padalino & Vivarelli, 1997; Pehekonen, 2000; Islam, 2004; Perugini, 2008). Though there is no conflict between the two objectives, the question that arises is the rate at which employment growth responds to economic growth. The policy focus on employment in Kenya is manifested by the sheer number of employment targeted development plans and Sessional papers that have been formulated (Omolo, 2012). Basically, all the policy documents developed by Kenya have premised employment creation on economic growth (Republic of Kenya, 1970; 1974; 2011; 2015).

The MTP I (2008-2012) had projected an annual average economic growth rate of 10 per cent and employment growth of 6 per cent yielding a total of 3.7million new jobs. However, an annual average of 511,000 new jobs were created in 2008-2012 against a target of 740,000 jobs per year (Republic of Kenya, 2013). During MTP

II (2013-2017), the government targeted the economy to grow at 10 per cent and create an average of one million new jobs. However, an average of 826,600 jobs were created annually.

The MTP III (2018-2022) targets to increase real GDP annual growth from an average of 5.5 per cent achieved over the 2013-2017 period to 7 per cent in order to support higher economic growth. It also aims to create over 6.5 million jobs over the Plan period. In the Kenya Vision 2030, employment creation is anchored, among others, on the implementation of fiscal policy measures in priority sectors. These priority sectors include agriculture, wholesale and retail trade, manufacturing, information and communication (ICT), finance and the tourism sector

Amanja and Morrissey (2006) focused on fiscal policy and economic growth in Kenya. Other studies in Kenya such as Omolo (2010; 2012), Balwanz (2012), ILO (2013) and Ponge (2013) concentrated on the determinants of unemployment. The effects of fiscal policy on employment elasticities have, therefore, not received much attention. This is despite intensive use of fiscal policy measures by the Kenya government as instruments of employment creation.

1.3 Research Questions

The study sought to answer the following questions:

- (i) What is the magnitude of employment elasticities in priority sectors of the Kenyan economy?
- (ii) What are the drivers of employment elasticities in Kenya?
- (iii) What is the response of employment elasticities to changes in fiscal policy variables in Kenya?

1.4 Objectives of the Study

The broad objective of the study was to analyze the relationship between fiscal policy and employment elasticities in Kenya. The specific objectives of the study were to:

- (i) Estimate the magnitude of employment elasticities in priority sectors of the Kenyan economy.
- (ii) Determine the drivers of employment elasticities in Kenya.
- (iii) Analyze the response of employment elasticities to changes in fiscal policy variables in Kenya

1.5 Significance of the Study

Employment creation is a key factor to the growth and development of any country and with the high increases in population, the study thus served as a necessary contribution to knowledge offering information regarding the same in Kenya. This study is important in that it shed light on the effects of the fiscal policy on

employment elasticities in Kenya. The results are useful in designing effective fiscal policy programme that can propel higher employment growth in the country.

The study provided insight to the labour policy makers on the choice of reforms programme as well as providing guidelines on the implementation of such reforms to promote robust economic performance. In addition, the study creates understanding on the different category of fiscal variables and how they affect the overall welfare of different economic agents. This is desirable for the budget making process since it can be used as a guiding principle when allocating national resources under different votes. The study contributes to the body of knowledge on the effectiveness of fiscal adjustment in achieving sustainable economic growth. It also provoke researchers to critically evaluate the effectiveness of different government policies in order to prescribe or suggest to the policy makers the best course of action for achieving economic goals.

1.6 Scope of the Study

The study focused on effects of fiscal policies on employment elasticities in Kenya. The study units were the priority sectors on the economic pillar in the *Kenya Vision 2030* as per International Standards Industrial Classification IV (ISIC IV). These sectors include tourism, agriculture, wholesale and retail trade, manufacturing, IT enabled services and financial services sectors. The study excluded oil and other mineral resources, and national values and ethics sectors that were not in the First Medium Term Plan (MTP I, 2008-2012) due to limitations of data. The study period was from 1970 to 2016.

1.7 Organization of the Study

The remaining part of this thesis is organized as follows; Chapter two presents a review of theoretical and empirical literature while chapter three describes the methodology used in the study. The remaining part of this thesis is organized as follows. Chapter four presents empirical results and discussions, while chapter five contains summary, conclusions, recommendations and areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, both theoretical and empirical literature on the relationship between fiscal policy and employment elasticities are reviewed. The first section reviews the theories that explain the effects of fiscal policy on employment elasticity while the second section reviews the empirical literature on this area. The final section deals with an overview of the empirical literature where the critique and the summary of the literature are done

2.2 Theoretical Literature

A number of theories have been advanced to explain the relationship between fiscal policy and employment elasticities. The theories include, Neo- classical theory, Keynesian theory, labour demand theory, Okun's law, and the tax smoothing approach. These theories have been reviewed in the sections that follow.

2.2.1 The Neo-Classical Theory

The neo-classical theory of growth (Solow, 1956), attempts to explain the determinants of long-run economic growth and reasons for the vast differences in both output levels and growth rates across countries over time. The theory also explains the relationship between investment, growth rate and employment in an economy with stationary growth. The neoclassical approach to labour market

analysis is based on a microeconomic level analysis. The approach views the labour market as similar to other markets in that the forces of supply and demand jointly determine the wage rate and the demand for labour.

Solow (1956) assumed that the consumer supplies labour, L_t to the market, at a market wage W_t . The consumer owns all of the capital K_t and rents to the market at rental rate r_t . The consumer also owns the firm and receives its total profit π_t where t denotes the time period. The consumer's income, Y_t is thus given by:

$$Y_t = r_t K_t + W_t L_t + \pi_t \quad (2.1)$$

Labour's share of output is estimated as:

$$\alpha_L = \frac{\partial Y_t}{\partial L_t} * \frac{L_t}{Y_t} \quad (2.2)$$

Where α_L is the output elasticity of labour. The neo classical theory is simple to understand and lends itself to testing the empirical work. The major contribution of this model is that it establishes the automatic stability of neo-classical growth path through the market adjustment mechanism. According to Bertola (1995), the various routes to full-employment via fiscal, monetary and population policies, leaves the nation some leeway to choose whether it wants high employment with high capital investment (rapid growth and low consumption) or the reverse or some mixture of both. A major advantage of this model of growth is that it provides a theoretical apparatus of exploring these practical possibilities. However, the neoclassical theory assumes technology to be completely exogenous and assumes the case of a closed economy.

The neo classical growth model plays an essential role in the development of dynamic general equilibrium analysis. For instance, the model uses Solow's residual to estimate relative impact of technology and capital accumulation on income growth. The Solow's model is important to the study because it can be used to explain the difference in the employment growth rates among sectors. This is because the model is an exogenous theory that attempts to explain long run economic growth and the causes of differences in economic performance across countries.

2.2.2 Labour Demand Theory

The theory of labour demand has its roots from Marshall (1890) and Hicks (1930). The labour demand theory states that the demand for labour is a derived demand, since workers are hired for their contribution in the production of goods and services. A key feature of the theory is that price flexibility plays an important role in the correction of labour market disequilibrium and market clearing. Assuming that there are only two factors of production, the number of employee-hours hired by the firm (L) and capital (K), the aggregate stock of land, machines, and other physical inputs, the production function is written as:

$$Y = f(K, L) \tag{2.3}$$

Where Y is the firm's output. The theory assumes that production exhibits constant return to scale as described by F such that:

$$F_i > 0, F_{ii} < 0 \text{ and } F_{ij} > 0$$

Where F_i represents marginal products. Elasticity of substitution is given by the rate of change in the use of K to L from a change in the relative price of w to r , holding output constant. Elasticity of substitution is by given:

$$\sigma = \frac{\partial \ln(K/L)}{\partial \ln(w/r)} = \frac{F_L F_K}{Y F_{LK}} \quad (2.4)$$

Where σ measures the ease of substituting one input for the other when the firm can only respond to a change in one or both of the input prices by changing the relative use of two factors without changing output. The constant output labour demand elasticity which is the change in demand for labour from a change in its wage is given by:

$$\eta_{LL} = \frac{\partial \ln L}{\partial \ln w} \quad (2.5)$$

Where η_{LL} is labour demand elasticity. Equation (2.5) implies that:

$$\eta_{LL} = -(1 - s)\sigma < 0 \quad (2.6)$$

Where s , ($s = \frac{wL}{Y}$) is the share of labour in total revenue. Equation (2.6) implies that when output requires substantial amounts of labour for production, the constant output labour demand elasticity will be smaller, because the possible change in spending on other factors is small relative to the amount of labour being used. Consequently, the constant output cross-elasticity of demand for labour describes the response to labour from a change in the price of capital is given as:

$$\eta_{LK} = \frac{\partial \ln L}{\partial \ln r} \quad (2.7)$$

Or,

$$\eta_{Lk} = -(1 - s)\sigma > 0 \quad (2.8)$$

The scale effect is the factor's share times the product demand elasticity. The scale effect takes into account the possibility that output will change as a response to a change in the price of labour, and that in turn may affect the overall demand for labour. The scale effect which is the total response from a change in the wage is given as:

$$\eta'_{LL} = -(1 - s)\sigma - s\varepsilon \quad (2.9)$$

Where $\eta = \frac{\partial \ln Y}{\partial \ln P} = \frac{\% \text{ change in output}}{\% \text{ change in prices}}$

Equation (2.9) is the fundamental law of factor demand. It divides the labour demand elasticity into substitution and scale effects. The labour demand theory is relevant to this study since it provides a partial explanation of employment-wage outcomes. This is because the effects of any policy that changes factor prices faced by employers depends on the structure of labour demand. The theory also analyses policies that affect labour cost depending on labour demand elasticities and establishes a link between productivity and wages.

2.2.3 Keynesian Theory

Keynesian theory was developed by John Maynard Keynes in the 1930s in an attempt to understand the Great Depression of western industrialized nations. Keynes (1936) advocated for increased government expenditures and lower taxes to stimulate demand and pull the global economy out of depression. Keynes (1936) considered unemployment as an involuntary phenomenon generated by the deficiency of aggregate demand. The Keynesian theory assumed wages to be rigid downwards resulting in high levels of unemployment.

Keynes (1936) was of the view that unemployment came about because aggregate demand was insufficient to generate enough jobs in the economy so as to satisfy all those seeking for jobs at any given wage rate. Accordingly, the remedial action to solve the unemployment phenomenon was for the government to adopt an expansionary fiscal policy framework, which would stimulate aggregate demand, thereby leading to increased employment. The Keynesian assumption that wages are sticky downwards meant that workers would not be happy taking wage cuts and would resist them. This meant that wages would not necessarily fall enough to clear the market and hence unemployment would linger. Keynesian theory also held the views that increase in public debt would raise the national income through multiple effects. The theory linked public borrowing with deficit financing and authorized government to borrow for all purposes so that effective demand in the economy would be increased resulting in increased employment and output. According to Keynes (1936) borrowing for consumption was as desirable as borrowing for investment in productive goods because consumption expenditure induced investment to rise. Keynesian analysis viewed government revenue, expenditure and government debt solely as instruments for the control of community expenditure. According to Mills (1991), a major limitation of the Keynesian theory was the failure to fully explain the micro foundations of the models which led to long-run consequences. This was because the theory was a short-run theory that only addressed short-run employment problems.

Keynesian theory is relevant to this study because it can explain the effects of fiscal policy on employment elasticity in Kenya. The Keynesian theory was based on the

existence of cyclical unemployment which occurs during a depression and caused by deficiency in effective demand. The Kenyan government has used expansionary fiscal policy to alleviate unemployment and spur economic growth. The government has also invested on infrastructure that expands the levels of employment through both direct and trickle down effects.

2.2.4 The Okun's Law

Okun's law was proposed by Arthur Okun in 1963. Basically, the genesis of employment elasticities can be traced to the Okun's Law. Okun's law is an empirical relationship between the change in the unemployment rate and the percentage growth in real output, as measured by GNP. The law states that if GNP grows rapidly, unemployment rate declines, if growth is low or negative, unemployment rate rises, and if growth equals potential, unemployment rate remains unchanged.

One way to derive Okun's law is to adopt the Solow framework model that is modified to include unemployment. The production function with labour augmenting technological progress is given by:

$$Q_t = AE_t^s K_t^{1-s} \exp(gt) \quad (2.10)$$

Where Q is output, A is efficiency parameter which grows at rate g , E is labour, K is capital, s is substitution parameter and t is time. Taking logs and using lower case letters to denote logs the resulting equation becomes:

$$q_t = \alpha + se_t + (1 - s)k_t + gt \quad (2.11)$$

Taking first differences equation (2.11) becomes:

$$\Delta q_t = se_t + (1 - s)\Delta k_t + g_t \quad (2.12)$$

Assuming that the growth rate of capital is constant, at Δk , the change in the unemployment rate is approximated as the difference between the constant growth rate in labour force minus the growth in employment:

$$\Delta u_t = \Delta n - \Delta e_t \quad (2.13)$$

Where u_t is the unemployment rate, e_t is the employment rate and Δn is the growth rate in labour force. Combining equation (2.12) and (2.13) the resulting equation becomes:

$$\Delta q_t = -s\Delta u_t + \{(1 - s)\Delta k_t + g - s\Delta n\} \quad (2.14)$$

Equation (2.14) is the standard form of Okun's Law and reflects the fact that in the long-run employment determines the output that can be supplied. Okun (1963) further formalized the relationship between unemployment and output growth into a statistical one by measuring the extent to which the unemployment rate is negatively related to real output growth. The standard specification for estimating Okun's law is specified as:

$$\Delta U_t = \alpha_0 + \alpha_1 \Delta \ln Y_t + v_t \quad (2.15)$$

Where ΔU_t is the yearly change in the unemployment rate, $\Delta \ln Y_t$ is the yearly change in output and v_t is an error term, α_0 is the coefficient parameter, α_1 is the coefficient of unemployment rate and t represented the time period. Though many economists have used Okun's law as a rule of the thumb to relate changes in unemployment to changes in output, the law is just an empirical correlation and not theoretically motivated. A more fundamental critique of the simple Okun equation is that the model neglects important explanatory variables that determines the levels of unemployment. As many of the reduced-form relationships build strictly on associations and not causation, Okun' law appears to vary depending on the sample period studied (Owyang & Sekhposyan, 2012).

Though Okun's law gives the relationship between the rate of economic growth and unemployment, the law is of relevance to this study since creation of employment opportunities may be deemed to imply a reduction in the rate of unemployment. The law is also used to measure the cost of unemployment and the gains of economic growth. Okun's law is relevant to this study since it forms the genesis of employment elasticities.

2.2.5 Tax Smoothing Approach

Barro's (1979) tax smoothing model is based on the idea that the government minimizes the distortion from taxation by allocating taxes over time. The tax-smoothing argument is that the government needs to finance a certain amount of spending in every period through taxes on labour income. Taxes are distortionary because they affect labour supply. Both the government and the agent have an

infinite temporal horizon, which means that neither intergenerational effects nor the finite terms of office for government are taken into account (Pinho, 2004). Barro (1979), postulated that in a deterministic context, optimal tax rates are constant, but in the case of a stochastic economy with incomplete financial markets, tax rates follow a more random pattern generated by a martingale process (Sargent, 2001). The tax distortion in the current period is assumed to be quadratic in tax rates in the form:

$$\left[\left(U_1 T_t + \frac{U_2}{2} T_t^2 \right) \right] \quad (2.16)$$

Where U_1 and U_2 are positive parameters and T_t is the tax rate in time t . The government chooses a sequence of tax rates $\{T_t\}_{t=0}^{\infty}$ in order to finance a stream of exogenous real government expenditure which follows a stochastic process. Thus, the tax smoothing hypothesis requires tax rates to be altered only when unpredicted shocks occur. This means that there should be no predictable changes in tax rates in ordinary times. Therefore, given the distortionary effects of taxation, the optimal strategy of the government is to use budget deficits and surpluses to smooth the economy, given a certain path of spending.

According to Alesina and Perotti (1995), in spite of its validity as a normative theory, the tax-smoothing approach is deficient as a positive theory of fiscal budgets. This is because the theory does not explain cross-country differences and debt accumulation overtime. Tax smoothing hypothesis however, can be used to determine the usage of budget deficits in Kenya. The tax smoothing hypothesis requires tax rates to be altered only when unpredicted shocks occur. Kenya like

other developing countries is prone to economic shocks like drought and famine. Since it is plausible to expect tax distortions to increase more than proportionally with tax rates, the hypothesis could have important policy implications. The government could minimize tax distortions by keeping tax rates relatively smooth rather than raising them in some periods and lowering them in other periods. This means that when there is a temporary shock to government spending or economic activity, instead of changing tax rates, public debt levels should be adjusted. The theory however falls short in explaining this study because it only deals with taxation component of fiscal policy ignoring government spending and debt.

2.3 Empirical Literature

Various studies have investigated the effects of various fiscal policies on employment elasticities. A review of these analytical studies is presented in the section that follow.

Baxter and King (1993) studied the equilibrium effects of fiscal policy disturbances by employing the basic neoclassical model that permits a variety of fiscal policy interventions in the United States (US) for the period 1930- 1985. The study adopted a log linear approach of the Euler equation approach to compute the sub optimal dynamic equilibria. The study found that permanent changes in government purchases had important effects on macroeconomic activities when financed by lump-sum taxation. There was likely to be a multiplier greater than 1 in the long run when labour supply was highly elastic. The study also found that that permanent changes in government purchases were associated with larger

output effects than temporary changes in purchases. The study concluded that the requirement that governments finance current expenditures from current revenues from distortionary taxes implied major differences in the response of the macro economy to both permanent and temporary changes in government purchases, relative to the case of lump-sum taxation. A major contribution of the study was that it uncovered empirical evidence of the predictions of the basic neoclassical model that had not been employed in the literature on the equilibrium approach to fiscal policy. The study also involved dynamic interactions of capital and labour absent in equilibrium analyses of fiscal policies. However, the present study deviates from this study in terms of focus. Baxter and King (1993) investigated equilibrium effects of fiscal policy on macroeconomic activities but the present study investigated impact of fiscal policy on employment elasticities in Kenya.

Ardagna (2001) studied the effects of fiscal policy in a dynamic equilibrium model with competitive labour markets in OECD countries for the period 1965 to 1995. The study investigated how changes to different spending and revenue items of the budget affect economic activities and also evaluated the welfare costs of alternative fiscal policy maneuvers. The study employed five fiscal policies that included employment, capital, consumption, private investment and public investments. The study showed that, unlike an increase in government purchases of final goods, an increase in public employment had a negative effect on the economy even when the increase was financed by lump-sum taxes. Similarly, the economy contracts in response to increases in transfers and labour and capital tax rates.

The study also suggested that fiscal adjustments implemented by cutting spending items were more effective in reducing the primary deficit and public debt than are increases in tax rates. They also had a positive effect on households' utility, both during the transition and in the long-run. However, these conclusions were dependent on the elasticity of the labour supply, on the initial values of the fiscal policy parameters, and on the assumption about the productivity of public employment. For certain values of the parameters, public employment was positively correlated with economic activity when it enhanced the productivity of private employment and capital. Hence, under certain circumstances, an increase in public employment benefits the economy. The study by Ardagna (2001) was limited in a number of ways. First the study assumed a perfect competitive labour market whereas a unionized labour market seems more realistic. Secondly, the study considered only the effects of changes in five fiscal policy variables whereas it could have been possible to study other items of the government budget.

Kapsos (2005) estimated global employment elasticities over the period 1991 to 2003 for 160 countries. The objective of the study was to generate estimates of total, youth, male and female employment elasticities using cross-country panel dataset. The study employed three approaches. The first approach involved estimating arc elasticity and the study found the measure to be highly unstable. The second approach entailed using a pooled regression of the form:

$$\ln E_i = \beta_0 + \beta_1 \ln Y_i + \beta_2 (\ln Y_i D_i) + \beta_3 D_i + U_i \quad (2.17)$$

Where E_i represented employment, D_i was country's dummy variables, Y represented total GDP, u was the error term, β_s were the regression coefficients and i represented a specific country. The estimated employment elasticities suffered from omitted variable bias, as no other variables that influenced either employment performance or overall economic performance were controlled for in the model.

The third approach used the estimated coefficients in the second approach to analyze possible determinants of elasticity levels. Variables explaining the development in demographics, the economic structure, macroeconomic volatility, trade openness, health, tax policy, and labour regulation were used. The results suggested that employment elasticities were positively related with the share of services in the economy, and negatively related with inflation and taxes on labour. The study further found that there was no statistical significant relationship between employment elasticities and employment protection regulations or measures of globalization and export orientation. However, Kapsos (2005) estimated global employment elasticities using 160 countries for the period 1991-2003 while the present study estimated employment elasticities in Kenya for the period 1970-2015. While Kapsos (2005) estimated national employment elasticities for different countries, the present study went further to estimate employment elasticities in priority sectors in Kenya.

Kon (2007) examined the employment effects of economic growth for the Korean economy for the period 1971-2005. The objective of the study was to determine the

structural determinants of employment elasticity. Time series data on GDP, employment and wages was used. Elasticity of employment with respect to growth of output was estimated by the equation:

$$\eta_{NY} = \frac{\varepsilon^{SNW}\zeta_{NK}}{(1-\varepsilon^{SNW}\zeta_{NN})} \quad (2.18)$$

Where η_{NY} was employment elasticity with respect to output growth, ε^{SNW} was labour supply elasticity with respect to real wages, ζ_{NK} and ζ_{NN} were elasticity of marginal product of labour with respect to capital and labour, respectively. The study found that the employment elasticity for Korean economy ranged between 0.49 and 0.38 for the period of the study. The study also established that the wage elasticity was higher than the employment elasticity over the same period. The study revealed that employment elasticity was determined by preference and technology parameters. The study concluded that there were other factors apart from the labour saving technology that were responsible for the slow growth in employment. However, as Kon (2007) evaluated labour supply, preference and technology parameters as the determinants of employment elasticity, the present study went further and introduced demographic factors such as working age population, labour force participation rate and population density as possible drivers of employment elasticity. Further both studies employed time series data. Kon (2007) focused in determining employment elasticity in Korea which is a developed country for the period 1971-2005 while the present study determined the employment elasticity in Kenya which is a developing country for the period 1970-2016.

Perugini (2008) investigated the relationship between employment and output growth in Italy for the period 1970-2004 through static panel data analysis. The objective of the study was to provide a measure of the relationship between employment and output growth in Italy and to illustrate its dynamics across a relatively extended time-span. This was estimated by the equation:

$$\ln L_{it} = \alpha_i + \beta_1 Y_{it} + \varepsilon_{it} \quad (2.19)$$

Where, L and Y were total employment units and real GDP, respectively in region i and at time t ; coefficient β was the estimated elasticity, α_i was the time invariant intercept and ε_{it} was the error term. The study found the existence of remarkable regional differences in employment elasticity levels. The study showed a trend of a relatively stable pattern, which lasted until the end of the 1980s then a steep fall that corresponded to employment drop of the first half of the 1990s. The trend led to negative employment elasticity in the periods within this time-span, a minimum level being reached from the end of the 1980s to end of the 1990s. The relative uniformity of the dynamics of elasticity for the geographical divisions meant that, at GDP level, movements of employment elasticity in time did not depend on spatially specific factors, but were probably influenced by complex and interacting aggregate dynamics. The study concluded that the increase in employment elasticity in the late 1990s was influenced by other institutional factors, especially those linked to various labour market reforms, which greatly favored more flexible employment of labour and stronger labour demand responsiveness to output changes. Whereas the current study adopted the model used by Perugini (2008) to

determine employment elasticities in Kenya, the study went further to determine the drivers of employment elasticities. However, while Perugini (2008) estimated employment elasticities for geographical regions in Italy, the present study estimated employment elasticities for priority economic sectors in Kenya.

Murwirapachena (2010) examined the impact of fiscal policy on unemployment in South Africa. The objective of the study was to examine the impact of government expenditure and taxation on unemployment. The study used annual time series data for the period 1980 to 2010 using a vector error correction model. The estimated model was specified as:

$$UNEMPLOY = \beta_0 + \beta_1 GOVSPEND + \beta_2 GOVIN + \beta_3 TAX + \mu \quad (2.20)$$

Where *UNEMPLOY* was unemployment in South Africa, *GOVSPEND* was government consumption expenditure, *GOVIN* was government investment expenditure and *TAX* was government taxation. β_s were the estimation parameters and μ was the error term. The results from the study revealed that government consumption expenditure and tax had a positive impact on unemployment while government investment expenditure negatively affected unemployment in South Africa. The study recommended that the government should spend more on investing in the promotion of agriculture in rural areas. The study also recommended that security should be allocated more funds from the budget because they improve the productivity of the public sector. The present study used a Vector autoregressive Method (VAR) to establish the effect of fiscal policy on employment elasticities as opposed to Murwirapachena (2010) who adopted a vector error

correction model to determine the effect of fiscal policy on unemployment in South Africa. As Murwirapachena (2010) used government consumption expenditure, government investment expenditure and taxes as fiscal policy variables, the present study went further to include more fiscal policy variables that included budget deficit, debt services, government recurrent expenditure and government development expenditure.

Njuru (2012) investigated the effects of fiscal policy on private investment in Kenya for the period 1964 to 2010. The objective of the study was to examine the relative influence of various taxes, government expenditure and debt on private investment in Kenya. The study employed vector auto-regression modeling technique and error correction model with the general functional form given by:

$$I = f(Y, MT, VAT, ED, CIT, DX, RX, BD, FS, DS, D1, D2, D3, D4, D5) \quad (2.21)$$

Where I was the private investment, Y was output, MT was income tax, VAT was value added tax, ED was excise duty, CIT was import tax, DX was government development expenditure, RX was government recurrent expenditure, BD was budget deficit, FS was foreign debt service and DS was domestic debt service. $D1$ was a dummy for the establishment of KRA, $D2$ was a dummy for economic liberalization, $D3$ was a dummy for tax amnesty, $D4$ was a dummy for expenditure downsizing while $D5$ was a dummy for the creation of EPZs.

The results revealed that government development expenditure impacted on private investment over a short period of time and government recurrent expenditure had

mixed effects on the private investment. The study also found that tax, government expenditure, government debt servicing and fiscal reforms could either promote or deter private investment both in the short-run and in the long-run. The study recommended that the government should streamline its expenditure as a way of reducing fiscal deficit. This was due to the fact that budget deficit was an impediment to private investment. The study further recommended the re-allocation of funds towards project that are beneficial to the private sector since the results indicated that development expenditure crowds-in private investment. Whereas the present study adopted the same model used by Njuru (2012) to examine the effects of fiscal policy on private investments in Kenya, the current study examined the effects of fiscal policy on employment elasticities. Also, as Njuru (2012) decomposed the tax component of the fiscal policy, the present study evaluated the effect of aggregate tax on employment elasticity. However this study went further to determine the drivers of employment elasticities.

Crivelli, Furceri and Bernate (2012) assessed the effect of structural and macroeconomic policies on the employment-intensity of growth for 167 countries using an unbalanced panel over the period 1991–2009. The objective of the study was to provide estimates of employment-output elasticities and assess the effect of structural and macroeconomic policies on the employment-intensity of growth. The study employed two approaches. The first approach consisted of estimating elasticities using time-series regressions for each country using the equation:

$$\ln(e_t) = \alpha + \rho_1 \ln(e_{t-1}) + \beta_1 \ln(y_t) + \omega_t \quad (2.22)$$

Where e_t was the level of employment at time t , and y_t was the level of GDP at time t , α was the intercept coefficient, ρ_1, β_1 were the regression coefficients and ω was the error term. The main advantage of the time series regressions was to directly provide country-specific employment estimates. The second approach relied on a panel framework in which long-term elasticities were estimated using country-specific estimates for GDP slopes and employment persistence using the equation:

$$\ln(e_{it}) = \alpha + \rho_1 \ln(e_{it-1}) + \rho_2 D_i \ln(e_{it-1}) + \beta_1 \ln(y_{it}) + \beta_2 D_i \ln(y_{it}) + \omega_{it} \quad (2.23)$$

Where e_{it} was the level of employment for country i at time t , and y_{it} was the level of GDP for country i in time t . D_i was a country-specific dummy, α was the intercept coefficient, ρ_s, β_s were the regression coefficients and ω was the error term. The study found that point estimates of elasticities fell between 0–1, with the majority of them ranging between 0.3 and 0.8. The elasticities varied considerably across regions, income groups, and production sectors with the highest estimates recorded for the most economically developed regions, industry and service sectors. The study also found that structural policies aimed at increasing labour and product market flexibility and reducing government size had significant and positive impact on employment elasticities. Macroeconomic policies aimed at reducing macroeconomic volatility also had a positive and statistically significant impact on employment elasticities. The study recommended that in order to maximize the positive impact on the responsiveness of employment to economic activity,

structural policies have to be complemented with macroeconomic policies aimed at increasing macroeconomic stability. The present study used time series data to establish the employment elasticities in Kenya as used by Crivelli, Furceri and Bernate (2012) to determine employment elasticities for 167 countries. Whereas Crivelli, Furceri and Bernate (2012) estimated global employment elasticities for 167 countries, the present study estimated employment elasticities for six priority sectors in Kenya.

Leshoro (2014) conducted an empirical analysis of employment elasticity of growth in Botswana. The objective of the study was to examine the employment elasticities for various sectors in Botswana. The study employed the error correction model (ECM) using data for the period 1980-2011. The estimated equation was:

$$\log E_t = \alpha_{0t} + \alpha_{1t} \log GDP + \alpha_{2t} \log GDP_{IND} + \alpha_{3t} \log GDP_{SER} + \alpha_{4t} \log GDP_{AGRI} + \varepsilon_t \quad (2.24)$$

Where, E was employment; GDP was the output growth, GDP_{IND} was the value added of the industrial sector, GDP_{SER} was the value added of the services sector and GDP_{AGRI} was the contribution of the agricultural sector to total GDP. α 's were the coefficients which were interpreted as elasticities, ε_t was the error term in period and t denoted the time period. The study found that employment elasticity of growth of total GDP was negatively related to employment growth. The study also revealed that the coefficients of the sectoral GDP contribution had positive effects on employment. The results also showed that the effect of any of the contributions from these sectors only had a bigger effect on the level of employment

after two years. The study recommended that the government policy should consider employment subsidies with more focus on youth employment subsidy and the creation of jobs which are more labour intensive. The present study estimated employment elasticities in priority sectors in Kenya similarly as Leshoro (2014) who estimated employment elasticities for Botswana. Whereas Leshoro (2014) employed an error correction model (ECM) for estimation, the present study employed a log linear regression model to estimate the sectoral employment elasticities. However, as Leshoro (2014) estimated employment elasticities for three sectors, the present study estimated employment elasticity for six priority sectors in Kenya.

Mouelhi and Ghazali (2014) estimated the employment intensity of growth among Tunisian productive sectors. The objective of the study was to determine the key economic sectors which are employment intensive. The study used time series data for the period 1980-2012. The study used a two-step approach. The first step was to establish sectoral employment elasticities. This was achieved through an OLS estimation of a multivariate log-linear regression model given by:

$$\ln L_t = \beta_0 + \beta_1 \ln Y_t + (\beta_2 \ln Y_t D_D) + \beta_3 D_D + \mu_t \quad (2.25)$$

Where Y was output, L was employment, D_D was time variable dummy, μ_t was the error term in period t , and β_s were the estimation coefficients. The second step was to investigate the determinants of employment elasticities. The second step involved using the estimated elasticities in step one as the dependent variable in the equation:

$$\ln \varepsilon_t = \alpha + \theta \ln l f_t + \beta \ln s c e s_t + \rho \ln i n f l a_t + \phi \ln e x c h_t + \nu \ln o p e n n e s s_t + \tau \ln w a g e_t + \mu_t \quad (2.26)$$

Where ε_t denoted overall growth-employment elasticity at time t , $l f$ was the growth rate of the labour force, $s c e s$ was the share of employment in services, $i n f l a$ was the annual inflation rate, $e x c h$ was the nominal exchange rate (Tunisian dinar/US dollar), $o p e n n e s s$ was a proxy for trade openness, $w a g e$ was the average annual real wage α was the intercept coefficient and μ_t was an error term.

The study found a significant decrease in total employment elasticity from 0.61 in 1980-1989 to 0.57 in 1991-1999 and 0.48 in 2000-2012. The study also revealed that agriculture and fishing, trade and tourism were the most labour-intensive sectors. The coefficients for both annual rate of inflation and the exchange rate were statistically significant but negatively associated with employment elasticity. The coefficients for the share of employment in services and the growth in labour force were not statistically significant to employment intensity. However, lower average wages seemed to induce higher employment-growth elasticity. The study concluded that in Tunisia, economic growth has been increasingly driven by productivity enhancement rather than by labour supply. The study by Mouelhi and Ghazali (2014) is relevant to the Kenyan case. The present study used a multivariate log linear regression model to estimate the employment elasticities for priority sectors in Kenya as used by Mouelhi and Ghazali (2014) to estimate the employment elasticity in Tunisian productive sectors. However, as Mouelhi and Ghazali (2014) focused on productive sectors, the present study focused on priority

sectors in Kenya. Mouelhi and Ghazali (2014) also evaluated only fiscal policies as the possible drivers of employment elasticities in Tunisia while the present study went further to include both fiscal and demographic factors.

Holden & Sparrman (2014) investigated the effect of changes in government purchases on unemployment and employment in 20 OECD countries, for the period 1980-2007. The study used panel data estimation, building on an empirical equation where long run unemployment was a function of a number of labour market variables.

The estimated equation was given by:

$$u_{it} = \beta_1 u_{it-1} + \beta_2 u_{it-2} + \beta_3 \Delta I_{it-1} + \beta_4 I_{it-2} + \beta_5 g_{it} + \beta_6 \Delta XM_{it} + \varepsilon_{it} \quad (2.27)$$

Where u_{it} was unemployment rate in a country i at period t , I_{it} was a vector of institutional labour market variable, g_{it} was government purchases, Δ was the first difference operator and XM_{it} was export market indicators. The study covered 20 countries for the period 1980-2007. The study revealed that a permanent increase in government purchases equal to one per cent of GDP on average led to a reduction in unemployment of 0.3 percentage points. There was, however, considerable variation in the effect of government purchases depending on the specific circumstances. The findings of the study were consistent with Auerbach and Gorodnichenko (2012), who found that during recessions, an increase in government purchases increases GDP and employment in OECD countries. Nakamura and Steinsson (2014) who found the same results while exploiting

differences across US regions, and Baum et al. (2012) who reported consistent evidence for some G7 countries. The effect on unemployment reflected a corresponding positive effect of increased government purchases on the employment to population rate. The present study deviated in focus from Holden and Sparrman (2014) who investigated the effect of changes in government purchases on unemployment and employment in 20 OECD countries by focusing on effects of fiscal policy variables on employment elasticities in Kenya.

Jiun and Gha (2011) investigated the relationship of economic growth, employment elasticity, and poverty in Malaysia. The objective of the study was to investigate the effect of economic growth and employment in poverty reduction. This was to be achieved through examining their associations at the level of each sector individually and all sectors as a whole. The study employed both the descriptive and Ordinary Least Square (OLS) regression method to estimate employment elasticities. Annual time series data for the period 1970 to 2009 was used. The study found that the employment elasticity for agriculture sector fluctuated and had great variations ranging between -29.63 and 14.78 during the period of study. The study also revealed that the employment elasticity of construction sector ranged between -7.25 and 64.05 and that the employment elasticity for manufacturing sector ranged between -17.81 and 13.79 during the period of study. The study concluded that the Malaysian employment elasticity declining trend was due to the improvement in the labour productivity. The study also concluded that that the construction sector was the most responsive compared to manufacturing sector and the agriculture sector. Jiun and Gha (2011) focused in estimating employment elasticities in

agriculture, construction and manufacturing sectors in Malaysia. The present study went further to estimate employment elasticities in key priority sectors in Kenya that included agriculture, manufacturing, wholesale and retail, tourism, finance and ICT.

Slimane (2015) assessed the determinants of cross-country variations in employment elasticities. The study focused on the role of demographic and macroeconomic variables. The study used an unbalanced panel of 90 developing countries from 1991 to 2011. The equation for a country's specific elasticities was given by:

$$\ln(e_t) = \alpha + \beta \ln(e_{t-1}) + \gamma \ln(y_t) + \omega_t \quad (2.28)$$

Where e_t was the level of employment at time t , y_t was the level of GDP at time t , β and γ were estimation coefficients, α was the intercept coefficient and ω_t was the error term. The study also estimated the long-term employment determinants to GDP elasticities for each country through the equation:

$$\hat{\gamma}_i = \alpha_i + \delta_1 m_i + \delta_2 S_i + \varepsilon_i \quad (2.29)$$

Where $\hat{\gamma}_i$ was employment elasticity for country i , m denoted macroeconomic variables, S denoted structural variables, δ_1 and δ_2 were the estimation coefficients α_i was the intercept coefficient and ε_i was the residual term. The results of the study indicated that the employment elasticity estimates varied considerably across countries. The highest estimates were found in Comoros, Gabon, Cote d'Ivoire, Niger, Algeria, Madagascar and Togo. In contrast, employment elasticities were

modest in other countries such as Bosnia (0.05), Ukraine (0.09) and China (0.10). Negative estimates were found for Serbia (-0.101), Belorussia (-0.112) and Romania (-0.238). The study also revealed that the macroeconomic policies aimed at reducing macroeconomic volatility had a statistically significant effect in increasing employment elasticities. Employment intensity of growth was found to be higher in countries with larger service sector and also for the countries with a higher share of urban population. A major contribution of the study was that it evaluated the effects of macroeconomic and demographic variables on employment intensity of growth an approach that has not been employed by other studies.

Akinkugbe (2015) focused on economic growth and sectoral capacity for employment creation in Zambia for the period 1990 -2008. The objective of the study was to assess the capacity of different sectors of the Zambian economy to absorb labour. This was achieved through a review of growth trends in the economic sub-sectors and computation of employment elasticity of growth. The study found that the average annual output growth was 3.6 per cent for the period 1990-2008, which produced an annual growth in employment of 10.04 per cent and an employment elasticity of 30.63. Between 2000 and 2005, the study showed that output growth averaged 5.1 per cent and employment creation was 7.1 per cent which resulted in an employment elasticity of 12.51. During the period 2005-2008, output growth grew at 5.9 per cent and generated an employment elasticity of 1.9 per cent. The study also found that, while employment elasticity were positive and significant for most sectors of the economy during the study period , the mining sector finance, insurance and business services sectors recorded a negative

employment elasticity. The study recommended that policy measures to tackle Zambia's unemployment problem would revolve around measures that could remove the impediments to growth in sectors with relatively high employment elasticities.

2.4 Overview of Literature

The literature reviewed provided a link that connects fiscal policy with employment elasticities. The key theories reviewed to provide the theoretical framework for the nexus between fiscal policy and employment elasticities were Keynesian theory, neoclassical theory, the Okun's law, the tax smoothing approach and the labour demand theory. One major gap of the theoretical models of fiscal policy is lack of a single model to directly link employment elasticities to fiscal policies.

The present study employed a multivariate log linear model to calculate employment elasticities in priority sectors in Kenya as envisioned in *Kenya Vision 2030*. Kapsos (2005) and Crivelli, Furceri & Bernate (2012) used the same approach but to estimate global employment elasticities for 160 and 167 countries respectively. Though the present study adopted the model used by Perugini (2008) to determine employment elasticities in priority sectors in Kenya, the study differed with Perugini (2008) who estimated employment elasticities for geographical regions in Italy and Mouelhi and Ghazali (2014) who focused on productive sectors in Tunisia.

The present study also sought to determine the determinants of employment elasticity in Kenya similar with Kon (2007), who sought to determine the drivers of employment elasticity for the Korean economy and Slimane (2015), for 90 countries. Kon (2007), evaluated labour supply, preference and technology parameters as possible determinants of employment elasticities, while Slimane (2015) evaluated both macroeconomic and structural factor as the determinants of employment elasticities. However, the present study deviated from the two studies by evaluating both macroeconomic variables and demographic variables as the possible determinants of employment elasticities.

Previous studies in other countries focused on a narrow set of sectors. Jiun and Gha (2011) focused on estimating employment elasticities in agriculture, construction and manufacturing sectors in Malaysia. Leshoro (2014) estimated employment elasticities for agriculture, services and industry sectors in Botswana. The present study went further to estimate employment elasticities in key priority sectors in Kenya that included agriculture, wholesale and retail, tourism, manufacturing finance and information and communication sector. The present study also deviated in terms of focus with Baxter and King (1993), who investigated equilibrium effects of fiscal policy on macroeconomic activities, Murwirapachena (2010) who investigated the effect of fiscal policy on unemployment in South Africa and Njuru (2012) who examined the effects of fiscal policy on private investments in Kenya. Much of the reviewed empirical literature was also based on developed countries and involved computing aggregate employment elasticities that could not relied upon for sector specific conclusions. Therefore, the present study sought to fill this

literature gap by investigating the effects of fiscal policy variables on employment elasticities in Kenya.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The research design, theoretical frameworks, various empirical methodologies that have been used in this study to achieve the set objectives are presented in this chapter. It also includes definition and measurement of variables, data type and sources and data analysis.

3.2 Research Design

The broad objective of this study was to analyze the relationship between fiscal policy and employment elasticities in Kenya. To achieve the objective, this study used non-experimental research design. The non-experimental research design is best suited for this study because the study does not involve variables that can be manipulated by the researcher (Creswell, 2009). Non experimental research design provides a proposed explanation for the relationship among variables being tested. It also includes elaborate structural equation models that incorporate causal paths and the identification of the collective strength of multiple variables (Creswell, 2003).

3.3 Theoretical Framework

Different theoretical frameworks have been used in addressing the effects of fiscal policy on employment elasticities. These include labour demand theory, Neo classical theory and Keynesian theory.

3.3.1 Sectoral Elasticity Model

The first objective of the study was to estimate the magnitude of employment elasticities in priority sectors of the Kenyan economy. To meet this objective, the neo classical theory as advanced by Solow (1956) was used. The consumer's income, Y_t takes the form:

$$Y_t = r_t K_t + W_t L_t + \pi_t \quad (3.1)$$

Where L_t is labour supply, W_t is market wage rate, K_t is capital, r_t is rental rate π_t is total profit and t denoted the time period.

Labour supply grows at an exogenous rate of g_l :

$$L_{t+1} = (1 + g_l)L_t \quad (3.2)$$

Capital is accumulated by the consumer and depreciates at rate δ

$$K_{t+1} = (1 - \delta)K_t + I_t \quad (3.3)$$

Where I_t is investment. The theory further assumes that firms can take capital and labour and convert them into output which is then sold back to the consumer. The firm's technology is described by the production function:

$$Y_t = A_t F(K_t, L_t) \quad (3.4)$$

Where A_t is the level of technology at time t , and grows at an exogenous rate g_A . That is:

$$A_{t+1} = (1 + g_A)A_t \quad (3.5)$$

Technological progress is deemed to increase the effective amount of labour. Assuming the factor markets are competitive, factors are rented by firms at marginal revenue product, and firm profits are zero. The wage, therefore, is:

$$w_t = \frac{\partial f(K_t A_t L_t)}{\partial L_t} \quad (3.6)$$

Output elasticity of labour is estimated as:

$$\alpha_L = \frac{\partial Y_t}{\partial L_t} * \frac{L_t}{Y_t} \quad (3.7)$$

Where α_L is the output elasticity of labour.

3.3.2: Drivers of Employment Elasticity Model

The second objective of the study was to determine the drivers of employment elasticities in Kenya. To meet this objective, labour demand theory was used. The labour demand theory is attributed to Marshall (1890) and Hicks (1930). The firm's production function describes the technology that the firm uses to produce goods and services. The firm's objective is to maximize profits that are given by:

$$\pi = PY - wL - rK \quad (3.8)$$

Where π is profit, P is the output price, w is the price for labour (wage rate) and r is the price for capital.

The first order conditions are given by:

$$F_L - \lambda w = 0 \quad (3.9a)$$

$$F_K - \lambda r = 0 \quad (3.9b)$$

Where λ is a Lagrangian multiplier. The ratio of the two first order conditions shows that the marginal rate of technical substitution, $\frac{F_L}{F_K}$, equals the factor-price ratio, $\frac{w}{r}$,

for a profit maximizing firm. Assuming a Cobb Douglas production function of the form:

$$Q = AL^\alpha K^\beta \quad (3.10)$$

Where Q is the level of output, A is technical efficiency, L is the labour input, K is capital input and α and β are elasticity parameters. The firms profit function is given by:

$$\pi = \text{MAX}_{L,K} [P(L^\alpha K^\beta) - wL - rK] \quad (3.11)$$

Where π is profit, P is the output price. w is wages and r is interest. The first order conditions for (L) and (K) respectively are given by:

$$\alpha P(L^{\alpha-1} K^\beta) = w \quad (3.12)$$

$$\beta P(L^\alpha K^{\beta-1}) = r \quad (3.13)$$

The equilibrium condition is given by combining the two first order conditions.

$$L = \left(\frac{\alpha P K^\beta}{w} \right)^{\frac{1}{1-\alpha}} \quad (3.14)$$

$$K = \left(\frac{\beta P L^\alpha}{r} \right)^{\frac{1}{1-\beta}} \quad (3.15)$$

Therefore,

$$K = \frac{\beta w L}{\alpha r} \quad (3.16)$$

Substituting equation (3.16) into equation (3.14) yields the demand function for labour, L

$$\alpha P(L^{\alpha-1} \frac{Y}{L^\alpha} = w) \quad (3.17)$$

$$L = \frac{\alpha P Y}{w} \quad (3.18)$$

Equation 3.18 is the derived labour demand function expressed as a function of output, real wage and the price level.

3.3.3: Fiscal Policy Variables and Employment Elasticities

To address the third objective, the study was anchored on Keynesian theory attributed to Keynes (1936). The Keynesian model aims to explain the level of aggregate demand, employment, interest rates and price level. The Keynesian model is also used to determine trade balances, consumption, investment and saving activities of the households and firms and government expenditure. Keynesian model assumes the aggregate supply to be perfectly flexible in the short run with a constant level of prices. Consumption, the major component of the aggregate demand is determined by disposable income as follows:

$$C_t = \beta_0 + \beta_1(Y_t - T_t) \quad (3.19)$$

where C_t is consumption, Y_t is national income, T_t is the tax rate, β_0 is the autonomous consumption, β_1 is the marginal propensity to consume out of disposable income and t is the time period. Investment is another major component of aggregate demand. Investment demand is determined by the rate of interest, the cost of capital and the change in the demand in the previous period as:

$$I_t = \mu_0 - \mu_1 R_t + \phi \Delta Y_t \quad (3.20)$$

Where I_t is investment, μ_0 is autonomous consumption, R_t is the rate of interest and ΔY_t is the change in demand. That is $\Delta Y_t = Y_t - Y_{t-1}$. Interest rate denotes the

cost of capital and determines the level of investment as shown by $\mu_1 = \frac{\partial I}{\partial R} < 0$.

$\emptyset = \frac{\partial I}{\partial Y} > 0$, implies that producers invest more if there is more aggregate demand.

Other components of aggregate demand include the government spending, (G_t) and exports (X_t). Keynesian model relates imports to level of domestic income and the real exchange rate:

$$M_t = M_0 + M_1 Y_t + M_2 \lambda_t \quad (3.21)$$

Where M_t is the imports, and λ_t is the real exchange rate defined as $\lambda_t = \frac{eP}{P^*}$. e is the nominal exchange rate, P is the domestic price level and P^* is foreign price level. Parameters M_0, M_1 and M_2 represent import behavior of the economy. Macroeconomic balance requires that aggregate demand be equal to aggregate income.

$$Y_t = C_t + T_t + S_t \quad (3.22)$$

Thus, the national income identity is given as:

$$C_t + T_t + S_t = Y_t = C_t + I_t + G_t + X_t - M_t \quad (3.23)$$

Where the left-hand side represents components of national income and the right-hand side represents components of aggregate demand. Equations (3.19) to (3.23) represent the real sector in the Keynesian model, where Y_t, I_t, C_t, M_t and R_t are endogenous variables, $\Delta Y_{t-1}, G_t, X_t$ and λ_t are predetermined variables and t is the time period. Keynesian model also assumes that the aggregate supply is fixed in the

short run and output is completely determined by the demand side of the economy. Fluctuations in consumption, investment, government consumption or exports are the sources of variations in income and employment in the short run.

Hicks (1937), formalized the Keynesian analysis in terms of investment - saving (IS model) and money market equilibrium (LM). The *IS* curve represents the equilibrium in the goods market given the aggregate supply by a production function of the form:

$$Y_t = F(\bar{K}, N) \quad (3.24)$$

Where Y_t is national income, \bar{K} is fixed level of capital, N is employment t is the time period. The stock of capital is fixed in the short run implying variability of output is directly associated with the amount of labour input in use. That is:

$$Y = F(\bar{K}, N) \quad (3.25)$$

Consumption depends on disposable income

$$C = c(Y^d) \quad (3.26)$$

Where C is consumption, Y^d is disposable income. The disposable income is defined as:

$$Y^d = (1 - \tau)Y \quad (3.27)$$

Where τ is the tax rate. Demand for labour is given by the marginal productivity of labour

$$N_D = F\left(\frac{W}{P}, \bar{K}\right) \text{ where, } MP_L = \frac{W}{P} \quad (3.28)$$

N_D is the demand for labour, $\frac{W}{P}$ is the real wage and \bar{K} is fixed stock of capital.

The Keynesian model also assumes that involuntary unemployment exists. The aggregate supply equals aggregate demand (aggregate income) function is expressed as:

$$Y = C + I + G + X - M \quad (3.29)$$

Where Y income, C is consumption, I is investment, G is government expenditure X is exports and M is imports. Money demand depends on income and the interest rate reflecting both precautionary and speculative demand for money and money supply is assumed exogenous. Equilibrium interest rate is given by intersection between demand and supply of money:

$$\frac{M}{P} = M_d(Y, r) \quad (3.30)$$

Where M_d is money demand, $\frac{M}{P}$ is real money supply. Y is income and r is interest rate. Substituting equation (3.25), (3.26) and (3.27) into (3.29) yields:

$$F(N, K) = c(F(N, K).(1 - \tau)) + I(r) + G + X - M \quad (3.31)$$

The left side represents the supply of goods and services and the right-hand side gives the aggregate demand. The model also assumes that exports equals imports.

The demand for labour equals the supply of labour in equilibrium and is obtained by equating real wage rate with the marginal productivity of labour as:

$$\frac{W}{P} = MP_L = \frac{\partial F_N}{\partial N} F_N(N, \bar{K}) \quad (3.32)$$

Rewriting equations (3.30), (3.31) and (3.32) in reduced form and taking total differential of the functions results in equations for employment, price and the interest rate.

$$dN + F_K dK = c(1 - \tau)F_N dN + c(1 - \tau)F_K dK - cd_r F(N, K) + I_r + dG \quad (3.33)$$

$$\frac{dW}{P} - \frac{W}{P^2} dP = F_{NN} dN + F_{NK} dK \quad (3.34)$$

$$F_{NN} dN + \frac{W}{P^2} dP = \frac{dW}{P} - F_{NK} dK \quad (3.35)$$

Rearranging for endogenous variables labour (dN), price (dP) and interest rate (dr) the model is written in a matrix notation as:

$$\begin{bmatrix} 1 - c(1 - \tau)F_N & 0 & -I_r \\ M_y F_N & \frac{M}{P^2} & M_r \\ F_{NN} & \frac{W}{P^2} & 0 \end{bmatrix} \begin{bmatrix} dN \\ dP \\ dr \end{bmatrix} = \begin{bmatrix} c(1 - \tau)F_K dK - F_K dK - cdr F(N, K) + dG \\ \frac{dM}{P} - M_y F_K dK \\ \frac{dW}{P} - F_{NK} dK \end{bmatrix} \quad (3.36)$$

Solving the matrix for the changes in the employment results in:

$$dN = \frac{1}{\Delta} \begin{bmatrix} c(1 - \tau)F_K dK - F_K dK - cdr F(N, K) + dG & 0 & -I_r \\ \frac{dM}{P} - M_y F_K dK & \frac{M}{P^2} & M_r \\ \frac{dW}{P} - F_{NK} dK & \frac{W}{P^2} & 0 \end{bmatrix} \quad (3.37)$$

$$dN = \frac{F_N}{\Delta} \left[-I_r \frac{W}{p^2} \left(\frac{dM}{p} - M_y F_K dK \right) + I_r \left(\frac{dW}{p} - F_{NK} dK \right) \frac{M}{p^2} - M_y \frac{w}{p^2} (c(1 - \tau F_K dK - F_K dK - cd\tau F(N, K) + dG) \right] \quad (3.38)$$

Equation 3.38 shows that the changes in the employment depends upon the monetary and fiscal policy variables as well as the structural parameters of the model.

3.4 Empirical Models

3.4.1 Sectoral Employment Elasticities

The first objective sought to estimate the magnitude of employment elasticities for priority sectors in Kenya. Given a general form of output elasticity of labour, (equation 3.7) was generalized to suit a log linear equation that represented the change in employment associated with a differential change in output. Specifically, the employment elasticity estimatable equation was given by equation 3.39 as put forth by Perugini (2008), Kapsos (2005) and Islam and Nazara (2000) as:

$$\ln L_t = \alpha_0 + \beta_1 \ln Y_t + \varepsilon_t \quad (3.39)$$

L and Y were total employment units and GDP respectively, for a specific sector and at time t . Coefficient β was the estimated elasticity, ε_t was the error term, and α_0 was the intercept.

3.4.2 Drivers of Employment Elasticity

The second objective sought to establish the drivers of employment elasticity in Kenya. Following the labour demand theory (Marshall, 1890 and Hicks, 1930), labour demand is a function of output, real wage and the price level as shown in equation 3.18. Relating labour demand to employment elasticity, the study improved on the model by Mouelhi and Ghazali (2014) by incorporating demographic factors. The demographic factors were included to assess the effect of agglomeration factors on employment elasticity. The estimatable equation was expressed as:

$$emp_t = f(infla_t, exch_t, openness_t, wage_t, popden, labforce, fdi) \quad (3.40)$$

The variable emp_t was the aggregate employment elasticity for all the sectors in period t , $infla$ was the annual inflation rate, $exch$ was the nominal exchange rate (Kenyan shillings/US dollar), $openness$ was a proxy for trade openness, $wage$ was the average annual real wage, $popden$ was the population density, $labforce$ was labour force participation rate and FDI was foreign direct investment. Population density and labour force participation rate also gave the effect of labour supply on aggregate employment elasticity.

3.4.3 Fiscal Policy Variables and Employment Elasticity

The third objective sought to determine the response of employment elasticities to changes in fiscal policy variables in Kenya. Following Keynes (1936), the changes in employment level depends upon the monetary and fiscal policies as indicated in

equation 3.38. Therefore, other than the determinants of changes in employment as shown by equation 3.38, the present study considered employment elasticity as function of fiscal policies. Mathematically, the equation relating employment elasticity and the fiscal policy was extended to incorporate fiscal policy variables as shown in equation 3.41.

$$emp_t = f(TAX_t DEV_t REC_t BD_t DEBT_t) \quad (3.41)$$

The variable emp_t is the aggregate employment elasticity, TAX is total tax revenue, DEV is development government expenditure, REC is recurrent government expenditure, BD is budget deficit, and $DEBT$ is debt service.

3.5 Definition and Measurement of Variables

The definition and measurement of the variables in equations (3.39), (3.40) and (3.41) are explained in Table 3.1.

Table 3.1: Measurement and Definition of Variables

Variable	Definition	Measurement
Employment elasticity (EMP)	Responsiveness of employment growth to economic growth	Measured as the ratio of the relative change in employment to the relative change in output.
Sectoral Employment (L_t)	Total number of workers employed in the formal sector.	Measured in numbers (thousands)
Sectoral GDP(Y_t)	Total value of final goods and services produced within a sector in a given period	Measured as the sector's GDP and expressed on annual basis in million Kenya shillings.
Income (Y)	Total value of final goods and services produced within the economy in a given period	Measured as the country's GDP and expressed on annual basis in million Kenya shillings.
Inflation (INFLA)	Sustained increase in the general price level of goods and services in an economy over a period of time.	Measured by change in consumer price index (CPI).
Real exchange rate (EXCH)	Nominal exchange rates adjusted for differences in price levels between two countries	Measured as a product of the nominal exchange rate (Kenya Shilling against the US dollar) and the ratio of the consumer price index, with year 2010 taken as the base year in both countries
Wage rate (WAGE)	It is a measure of the price of labour.	Measured as the average monthly earnings per employee for each of the sectors, over time
Population Density (POPDEN)	It is a measure of the intensity of land use.	Measured as the average population per square kilometer

Table 3.1: Continued

Variable	Definition	Measurement
Labour Force Participation rate	Labour force participation rate is defined as the section of working population in the age group of 16-64 in the economy currently employed or seeking employment.	It is calculated as the labour force divided by the total working-age population. It is used as a proxy for those individuals aged between 16-64 years.
Foreign Direct Investment(FDI)	It is the direct investment in productive assets by an entity established in a foreign country	Measured as a percentage of investment inflows to GDP.
Trade Openness (OPENNESS)	The extent which an economy is open to trade	The ratio of the value of the total foreign (exports + imports) to the GDP
Tax Revenue	This is the revenue collected from all taxes	Measured by adding up all revenues from all tax components
Development Government Expenditure	It is the government expenditure on capital overheads.	Measured by the total government expenditure less recurrent expenditure
Recurrent Government Expenditure	It is the current expenditure for purchase of goods and services at all levels of government.	Measured by recurrent expenditure on labour costs and other goods and services.
Debt	The rate of a country's indebtedness which compares the country's outstanding public debt and her GDP in each year.	Measured by taking the ratio of outstanding public debt to GDP in a given year.
Budget Deficit	It refers to the total government revenue less total expenditure.	Measured by deducting total expenditure (re- current and capital) from total revenue (tax and non-tax).

3.6 Data Type and Source

The study used annual time series data for the period 1970 to 2016. The choice of the period was primarily informed by availability of data. Data was obtained from different sources as indicated in Table 3.2.

Table 3.2: Data Sources

VARIABLE	DATA SOURCE
Employment elasticity	Computed from data collected from Kenya Economic Surveys
Development expenditure government Recurrent expenditure government Budget Deficit	Kenya Economic Surveys
Inflation, Exchange rate	Central Bank of Kenya annual reports and Kenya Economic Surveys
Tax revenue	Kenya economic surveys
Foreign Direct Investment	Kenya Economic Surveys
Trade Openness	The National Treasury reports
Labour Force, Population Density	World Bank's Kenya data base
Wage rate	Kenya Statistical Abstracts
Debt	World bank Kenya data base

3.7 Diagnostic Tests

The study used time series data and in order to mitigate against spurious results due to the problems of non-stationarity of time series data, the study carried out non stationarity tests.

3.7.1 Testing for Non Stationarity of Data

To detect the presence of unit root in the series, the study employed the Clemente Montanes Reyes (CMR) test. The CMR test is based on the approach that allows for the possibility of having structural breaks in the mean of the series. Structural breaks reflects institutional, technical or legislative changes. The breaks can also reflect changes in economic policies or large economic shocks. The advantage of testing for unit root and at the same time allowing for structural breaks prevents the tests results from being biased towards non stationarity and unit root. Another advantage is that these tests can identify when the breaks occurred (Perron, 1989). The CMR test is based on the general augmented Dickey Fuller test (ADF) model that is expressed as:

$$\Delta Y_t = \rho Y_{t-1} + \sum_{j=1}^{\rho-1} \gamma Y_{t-j} + \mu_t + u_t \quad (3.42)$$

Where Y_t is a time series of T observations and $\mu_t = \mu_0 + \mu_{1t}$ are deterministic terms (if $\mu_0 \neq 0$ there is a constant, and there is a deterministic trend when $\mu_0 \neq 1$). The ADF test statistic has a null hypothesis of a unit root process that is, ($\rho = 0$) against the alternative of a stationary ($\rho < 0$) and ($\mu_1 = 0$) or trend stationary ($\rho < 0$) and ($\mu_1 \neq 0$) process. The CMR test improves on the ADF test by providing for structural breaks in the model. This is expressed as:

$$\Delta Y_t = \rho Y_{t-1} + \sum_{j=1}^{\rho-1} \gamma Y_{t-j} + \mu_t + u_t \quad (3.43)$$

Where $\mu_t = \mu_0 + \mu_0^s d_{tTB} + \mu_{1t} + \mu_1^s (t - TB) d_{tTB}$ are the possible deterministic terms (which contains a constant when $\mu_0 \neq 0$ and deterministic trend when $\mu_0 \neq 1$). The break date is at time T_B . In particular, Perron and Vogelsang (1992) developed three trend break models. These tests for the existence of unit root taking three types of structural breaks into account. At first, there is a model which contains a linear trend with an intercept shift specified as;

$$\mu_t = \mu_0 + \mu_0^s d_{tTB} + \mu_{1t} \quad (3.44)$$

Where:

$$d_{tTB} = \begin{cases} 0, & t < T_B \\ 1, & t \geq T_B \end{cases} \quad (3.45)$$

A linear trend model with a change in slope of the linear trend and the two segments joined at the break date specified as;

$$\mu_t = \mu_0 + \mu_{1t} + \mu_1^s (t - TB) d_{tTB} \quad (3.46)$$

$$d_{tTB} = \begin{cases} 0, & t < T_B \\ 1, & t \geq T_B \end{cases} \quad (3.47)$$

And finally a combined model with intercept and slope change.

$$\mu_t = \mu_0 + \mu_0^s d_{tTB} + \mu_{1t} + \mu_1^s (t - TB) d_{tTB} \quad (3.48)$$

$$d_{tTB} = \begin{cases} 0, & t < T_B \\ 1, & t \geq T_B \end{cases} \quad (3.49)$$

Clemente, Montanes and Reyes (1998) extended the Perron and Vogelsang (1992) model to take care of two structural changes in the mean. The CMR test is based

on a modification of the tests by Perron and Vogelsang (1992) known as the additive outlier (AO) model and the innovative outlier (IO) model. The AO describes the break as occurring suddenly through changes in the mean and the IO views the break as sprouting slowly over time. The CMR test has a null hypothesis(H_0) that the series has a unit root with structural break(s) against the alternative hypothesis (H_1) that they are stationary with break(s). The CMR test hypothesis is specified as;

$$H0: y_t = y_{t-1} + \delta_1 DTB_{1t} + \delta_2 DTB_{2t} + \mu_t \quad (3.50)$$

$$H1: y_t = \mu + d_1 DU_{1t} + d_2 DTB_{2t} + \varepsilon_t \quad (3.51)$$

Where DTB_{1t} is a pulse variable equal to one if $t = TB_i + 1$ and becomes zero otherwise. $DU_{1t} = 1$ if $t > TB_i (i = 1,2)$ and zero otherwise. TB_1 and TB_2 represents the time periods when the mean is being modified.

3.8 Data Analysis

The first objective of the study was to estimate the magnitude of employment elasticities in priority sectors of the Kenyan economy identified in Vision 2030. To achieve this objective, equation 3.39 was estimated using OLS method to establish the employment elasticity per sector (β_i). The OLS method was preferred to the arc elasticity method since Islam and Nazara (2000) and Islam (2004) have demonstrated that employment elasticities calculated using arc method tend to exhibit a great deal of instability. A value of β greater than zero but less than one implied that the specific sector was employment inelastic, a value of β equal to

one was taken to reflect unitary employment elasticity and a value of β greater than one was interpreted to imply that the specific sector was employment elastic.

3.8.1 Auto Regressive Distributed Lag Model

The second objective of the study was to establish the drivers of employment elasticities in Kenya. To achieve this objective, equation 3.40 was estimated using an Auto Regressive Distributed Lag (ARDL) model. An ARDL model is a standard least squares regressions that include lags of both the dependent variable and explanatory variables as regressors (Greene, 2008). An ARDL model for employment elasticities with the regressors identified in the functional relationship (3.40) was expressed as:

$$\begin{aligned}
 emp_t = & \beta_0 + \sum_{i=1}^K \beta_{1i} emp_{t-1} + \sum_{i=0}^K \beta_{2i} infla_{t-1} + \sum_{i=0}^K \beta_{3i} exch_{t-1} + \\
 & \sum_{i=0}^K \beta_{4i} openness_{t-1} + \sum_{i=0}^K \beta_{5i} wage_{t-1} + \sum_{i=0}^K \beta_{6i} popden_{t-1} + \\
 & \sum_{i=0}^K \beta_{7i} labforce_{t-1} + \sum_{i=0}^K \beta_{8i} fdi_{t-1} + \varepsilon_t
 \end{aligned}
 \dots\dots\dots (3.52)$$

This was the general ARDL model which was then rewritten as:

$$\begin{aligned}
 emp_t - \sum_{i=1}^K \beta_{1i} emp_{t-1} = & \beta_0 + \sum_{i=0}^K \beta_{2i} infla_{t-1} + \sum_{i=0}^K \beta_{3i} exch_{t-1} + \\
 & \sum_{i=0}^K \beta_{4i} openness_{t-1} + \sum_{i=0}^K \beta_{5i} wage_{t-1} + \sum_{i=0}^K \beta_{6i} popden_{t-1} + \\
 & \sum_{i=0}^K \beta_{7i} labforce_{t-1} + \sum_{i=0}^K \beta_{8i} fdi_{t-1} + \varepsilon_t \dots\dots\dots (3.53)
 \end{aligned}$$

Equation (3.53) can be represented by introducing a lag operator $A(L)$ equal one minus the sum of coefficient of lagged values of the dependent variable. Hence the equation becomes:

$$A(L)emp_t = \beta_0 + \beta_2(L)infla_t + \beta_3(L)exch_t + \beta_4(L)openness_t + \beta_5(L)wage_t + \beta_6(L)popden_t + \beta_7(L)labforce_t + \beta_8(L)fdi_t + \varepsilon_t \dots (3.54)$$

The distributed lag form of the model that defined long run relationship was thus given as:

$$emp_t = \frac{\beta_0}{A(L)} + \frac{\beta_1}{A(L)}infla_t + \frac{\beta_1}{A(L)}infla_t + \frac{\beta_1}{A(L)}exch_t + \frac{\beta_1}{A(L)}openness_t + \frac{\beta_1}{A(L)}wage_t + \frac{\beta_1}{A(L)}popden_t + \frac{\beta_1}{A(L)}labforce_t + \frac{\beta_1}{A(L)}fdi_t + \varepsilon_t \dots (3.55)$$

The coefficients of equation (3.55) gave the long run estimates.

The short run effects of employment elasticity was given by the error correction version of ARDL model. The short run coefficients were estimated based on ECM derived from the ARDL model given in equation 3.56.

$$\Delta emp_t = \alpha_0 + \sum_{i=1}^K \alpha_{1i} \Delta(emp)_{t-1} + \sum_{i=0}^K \alpha_{2i} \Delta(infla)_{t-1} + \sum_{i=0}^K \alpha_{3i} \Delta(exch)_{t-1} + \sum_{i=0}^K \alpha_{4i} \Delta(openness)_{t-1} + \sum_{i=0}^K \alpha_{5i} \Delta(wage)_{t-1} + \sum_{i=0}^K \alpha_{6i} \Delta(popden)_{t-1} + \sum_{i=0}^K \alpha_{7i} \Delta(labforce)_{t-1} + \sum_{i=0}^K \alpha_{8i} \Delta(fdi)_{t-1} + \lambda ECT_{t-1} + \varepsilon_t \dots (3.56)$$

Where α_i gave short run coefficients, λ was the speed of adjustment parameter and ECT was the residuals that were obtained from the estimated cointegration model of equation (3.55). The ARDL model was employed so as to capture the partial adjustments and adaptive expectations in employment elasticity in Kenya. A similar approach was used by (Nakata & Takehiro, 2003) to estimate both partial adjustments and the elasticities of employment with respect to output and the

relative wage in Japan. The partial employment adjustment model helped to explain the employment elasticity adjustment behavior and the observed employment fluctuations. The adaptive expectations model explained how the economy compensates for long-run adjustment of employment elasticity to changes in relative output by speeding up short-run employment adjustments.

3.8.2 Structural Vector Auto Regression Analysis (SVAR)

The study used Sims' (1986) structural VAR approach to establish the effect of fiscal policy variables on employment elasticities in Kenya. The structural var was used because it allows to predict the effect of interventions or deliberate policy actions in the economy. The structural VAR was also used because variables were integrated of different orders and differencing throws away information concerning the co-movements in the data such as the possibility of cointegrating relationships (Enders, 2015). According to Enders (2015), the aim of a structural VAR is to use economic theory to recover the structural innovations from the residuals. The structural model comprised of six variables as expressed in equation 3.41. The variables included employment elasticity(*emp*), total tax revenue(*tax*), development expenditure(*dev*), recurrent expenditure(*rec*), budget deficit(*bd*) and public debt(*debt*).

The structural model used was represented as:

$$X_t = \phi_{10}X_{t-1} + \phi_{11}X_{t-2} + \dots + \phi_{1p}X_{t-p} + \mu_t \quad (3.57)$$

Where X_t is $n \times 1$ stationary vector which can be written as:

$$X_t = \begin{bmatrix} emp_t \\ tax_t \\ dev_t \\ rec_t \\ bd_t \\ debt_t \end{bmatrix}$$

$$\begin{aligned} emp_t &= \alpha_{10} + \alpha_{11}tax_t + \alpha_{12}dev_t + \alpha_{13}rec_t + \alpha_{14}bd_t + \alpha_{15}debt_t + \\ &\alpha_{16}emp_{t-1} + \alpha_{17}tax_{t-1} + \alpha_{18}dev_{t-1} + \alpha_{19}rec_{t-1} + \alpha_{110}bd_{t-1} + \\ &\alpha_{111}debt_{t-1} + \varepsilon_{emp} \end{aligned} \quad (3.58)$$

$$\begin{aligned} tax_t &= \alpha_{20} + \alpha_{21}emp_t + \alpha_{22}dev_t + \alpha_{23}rec_t + \alpha_{24}bd_t + \alpha_{25}debt_t + \\ &\alpha_{26}tax_{t-1} + \alpha_{27}emp_{t-1} + \alpha_{28}dev_{t-1} + \alpha_{29}rec_{t-1} + \alpha_{210}bd_{t-1} + \\ &\alpha_{211}debt_{t-1} + \varepsilon_{tax} \end{aligned} \quad (3.59)$$

$$\begin{aligned} dev_t &= \alpha_{30} + \alpha_{31}emp_t + \alpha_{32}tax_t + \alpha_{33}rec_t + \alpha_{34}bd_t + \alpha_{35}debt_t + \\ &\alpha_{36}dev_{t-1} + \alpha_{37}emp_{t-1} + \alpha_{38}tax_{t-1} + \alpha_{39}rec_{t-1} + \alpha_{310}bd_{t-1} + \\ &\alpha_{311}debt_{t-1} + \varepsilon_{dev} \end{aligned} \quad (3.60)$$

$$\begin{aligned} rec_t &= \alpha_{40} + \alpha_{41}emp_t + \alpha_{42}tax_t + \alpha_{43}dev_t + \alpha_{44}bd_t + \alpha_{45}debt_t + \\ &\alpha_{46}rec_{t-1} + \alpha_{47}emp_{t-1} + \alpha_{48}tax_{t-1} + \alpha_{49}dev_{t-1} + \alpha_{410}bd_{t-1} + \\ &\alpha_{411}debt_{t-1} + \varepsilon_{rec} \end{aligned} \quad (3.61)$$

$$\begin{aligned} bd_t &= \alpha_{50} + \alpha_{51}emp_t + \alpha_{52}tax_t + \alpha_{53}dev_t + \alpha_{54}rec_t + \alpha_{55}debt_t + \\ &\alpha_{56}bd_{t-1} + \alpha_{57}emp_{t-1} + \alpha_{58}tax_{t-1} + \alpha_{59}dev_{t-1} + \alpha_{510}rec_{t-1} + \\ &\alpha_{511}debt_{t-1} + \varepsilon_{bd} \end{aligned} \quad (3.62)$$

$$\begin{aligned}
debt_t &= \alpha_{60} + \alpha_{61}emp_t + \alpha_{62}tax_t + \alpha_{63}dev_t + \alpha_{64}rec_t + \alpha_{65}bd_t + \\
&\alpha_{66}debt_{t-1} + \alpha_{67}emp_{t-1} + \alpha_{68}tax_{t-1} + \alpha_{69}dev_{t-1} + \alpha_{610}rec_{t-1} + \\
&\alpha_{611}bd_{t-1} + \varepsilon_{debt}
\end{aligned} \tag{3.63}$$

Expressing the endogenous variables as functions of the exogenous variables yields:

$$\begin{aligned}
emp_t - \alpha_{11}tax_t - \alpha_{12}dev_t - \alpha_{13}rec_t - \alpha_{14}bd_t - \alpha_{15}debt_t &= \alpha_{10} + \\
\alpha_{16}emp_{t-1} + \alpha_{17}tax_{t-1} + \alpha_{18}dev_{t-1} + \alpha_{19}rec_{t-1} + \alpha_{110}bd_{t-1} + \\
\alpha_{111}debt_{t-1} + \varepsilon_{emp}
\end{aligned} \tag{3.64}$$

$$\begin{aligned}
-\alpha_{21}emp_t + tax_t - \alpha_{22}dev_t + \alpha_{23}rec_t + \alpha_{24}bd_t + \alpha_{25}debt_t &= \alpha_{20} + \\
\alpha_{26}emp_{t-1} + \alpha_{27}tax_{t-1} + \alpha_{28}dev_{t-1} + \alpha_{29}rec_{t-1} + \alpha_{210}bd_{t-1} + \\
\alpha_{211}debt_{t-1} + \varepsilon_{tax}
\end{aligned} \tag{3.65}$$

$$\begin{aligned}
-\alpha_{31}emp_t - \alpha_{32}tax_t + dev_t - \alpha_{33}rec_t - \alpha_{34}bd_t - \alpha_{35}debt_t &= \alpha_{30} + \\
\alpha_{36}emp_{t-1} + \alpha_{37}tax_{t-1} + \alpha_{38}dev_t + \alpha_{39}rec_t + \alpha_{310}bd_t + \alpha_{311}debt_t + \varepsilon_{dev}
\end{aligned} \tag{3.66}$$

$$\begin{aligned}
-\alpha_{41}emp_t - \alpha_{42}tax_t - \alpha_{43}dev_t + rec_t - \alpha_{44}bd_t + \alpha_{45}debt_t &= \alpha_{40} + \\
\alpha_{46}emp_{t-1} + \alpha_{47}tax_{t-1} + \alpha_{48}dev_t + \alpha_{49}rec_t + \alpha_{410}bd_t + \alpha_{411}debt_t + \varepsilon_{rec}
\end{aligned} \tag{3.67}$$

$$\begin{aligned}
& -\alpha_{51}emp_t - \alpha_{52}tax_t - \alpha_{53}dev_t - \alpha_{54}rec_t + bd_t\alpha_{55} - debt_t = \alpha_{50} + \\
& \alpha_{56}emp_{t-1} + \alpha_{57}tax_{t-1} + \alpha_{58}dev_{t-1} + \alpha_{59}rec_{t-1} + \alpha_{510}bd_{t-1} + \\
& \alpha_{511}debt_{t-1} + \epsilon_{bd}
\end{aligned} \tag{3.68}$$

$$\begin{aligned}
& -\alpha_{61}emp_t - \alpha_{62}tax_t - \alpha_{63}dev_t - \alpha_{64}rec_t - \alpha_{65}bd_t + debt_t = \alpha_{60} + \\
& \alpha_{66}emp_{t-1} + \alpha_{67}tax_{t-1} + \alpha_{68}dev_{t-1} + \alpha_{69}rec_{t-1} + \alpha_{610}bd_{t-1} + \\
& \alpha_{611}debt_{t-1} + \epsilon_{debt}
\end{aligned} \tag{3.69}$$

Expressing the system of equations 3.64 to 3.69 in matrix form yields:

$$\begin{bmatrix} 1 & -\alpha_{11} & -\alpha_{12} & -\alpha_{13} & -\alpha_{14} & -\alpha_{15} \\ -\alpha_{21} & 1 & -\alpha_{22} & -\alpha_{23} & -\alpha_{24} & -\alpha_{25} \\ -\alpha_{31} & -\alpha_{32} & 1 & -\alpha_{33} & -\alpha_{34} & -\alpha_{35} \\ -\alpha_{41} & -\alpha_{42} & -\alpha_{43} & 1 & -\alpha_{44} & -\alpha_{45} \\ -\alpha_{51} & -\alpha_{52} & -\alpha_{53} & -\alpha_{54} & 1 & -\alpha_{55} \\ -\alpha_{61} & -\alpha_{62} & -\alpha_{63} & -\alpha_{64} & -\alpha_{65} & 1 \end{bmatrix} \begin{bmatrix} emp_t \\ tax_t \\ dev_t \\ rec_t \\ bd_t \\ debt_t \end{bmatrix} = \begin{bmatrix} \alpha_{10} \\ \alpha_{20} \\ \alpha_{30} \\ \alpha_{40} \\ \alpha_{50} \\ \alpha_{60} \end{bmatrix} + \begin{pmatrix} \alpha_{16} & \alpha_{16} & \alpha_{18} & \alpha_{19} & \alpha_{110} & \alpha_{111} \\ \alpha_{26} & \alpha_{27} & \alpha_{28} & \alpha_{29} & \alpha_{210} & \alpha_{211} \\ \alpha_{36} & \alpha_{36} & \alpha_{38} & \alpha_{39} & \alpha_{310} & \alpha_{311} \\ \alpha_{46} & \alpha_{47} & \alpha_{48} & \alpha_{49} & \alpha_{510} & \alpha_{511} \\ \alpha_{56} & \alpha_{57} & \alpha_{58} & \alpha_{59} & \alpha_{510} & \alpha_{511} \\ \alpha_{66} & \alpha_{67} & \alpha_{68} & \alpha_{69} & \alpha_{610} & \alpha_{611} \end{pmatrix} \begin{bmatrix} emp_{t-1} \\ tax_{t-1} \\ dev_{t-1} \\ rec_{t-1} \\ bd_{t-1} \\ debt_{t-1} \end{bmatrix}$$

$$\begin{pmatrix} \beta_1 & 0 & 0 & 0 & 0 & 0 \\ 0 & \beta_2 & 0 & 0 & 0 & 0 \\ 0 & 0 & \beta_3 & 0 & 0 & 0 \\ 0 & 0 & 0 & \beta_4 & 0 & 0 \\ 0 & 0 & 0 & 0 & \beta_5 & 0 \\ 0 & 0 & 0 & 0 & 0 & \beta_6 \end{pmatrix} \begin{bmatrix} \epsilon_{emp_t} \\ \epsilon_{tax_t} \\ \epsilon_{dev_t} \\ \epsilon_{rec_t} \\ \epsilon_{bd_t} \\ \epsilon_{debt_t} \end{bmatrix} \tag{3.70}$$

Equation 3.66 represents the matrix in structural VAR form. The matrix can also be represented in reduced form as:

$$AX_t = \alpha_{1i} + \beta_i X_{t-1} + \epsilon_t \tag{3.71}$$

$$X_t = A^{-1}\alpha_{1i} + A^{-1}\beta_i X_{t-1} + A^{-1}\varepsilon_t \quad (3.72)$$

$$\begin{bmatrix} emp_t \\ tax_t \\ dev_t \\ rec_t \\ bd_t \\ debt_t \end{bmatrix} = \begin{bmatrix} 1 & -\alpha_{11} & -\alpha_{12} & -\alpha_{13} & -\alpha_{14} & -\alpha_{15} \\ -\alpha_{21} & 1 & -\alpha_{22} & -\alpha_{23} & -\alpha_{24} & -\alpha_{25} \\ -\alpha_{31} & -\alpha_{32} & 1 & -\alpha_{33} & -\alpha_{34} & -\alpha_{35} \\ -\alpha_{41} & -\alpha_{42} & -\alpha_{43} & 1 & -\alpha_{44} & -\alpha_{45} \\ -\alpha_{51} & -\alpha_{52} & -\alpha_{53} & -\alpha_{54} & 1 & -\alpha_{55} \\ -\alpha_{61} & -\alpha_{62} & -\alpha_{63} & -\alpha_{64} & -\alpha_{65} & 1 \end{bmatrix}^{-1} \begin{bmatrix} \alpha_{10} \\ \alpha_{20} \\ \alpha_{30} \\ \alpha_{40} \\ \alpha_{50} \\ \alpha_{60} \end{bmatrix} + \begin{bmatrix} 1 & -\alpha_{11} & -\alpha_{12} & -\alpha_{13} & -\alpha_{14} & -\alpha_{15} \\ -\alpha_{21} & 1 & -\alpha_{22} & -\alpha_{23} & -\alpha_{24} & -\alpha_{25} \\ -\alpha_{31} & -\alpha_{32} & 1 & -\alpha_{33} & -\alpha_{34} & -\alpha_{35} \\ -\alpha_{41} & -\alpha_{42} & -\alpha_{43} & 1 & -\alpha_{44} & -\alpha_{45} \\ -\alpha_{51} & -\alpha_{52} & -\alpha_{53} & -\alpha_{54} & 1 & -\alpha_{55} \\ -\alpha_{61} & -\alpha_{62} & -\alpha_{63} & -\alpha_{64} & -\alpha_{65} & 1 \end{bmatrix}^{-1} \begin{pmatrix} \alpha_{16} & \alpha_{16} & \alpha_{18} & \alpha_{19} & \alpha_{110} & \alpha_{111} \\ \alpha_{26} & \alpha_{27} & \alpha_{28} & \alpha_{29} & \alpha_{210} & \alpha_{211} \\ \alpha_{36} & \alpha_{36} & \alpha_{38} & \alpha_{39} & \alpha_{310} & \alpha_{311} \\ \alpha_{46} & \alpha_{47} & \alpha_{48} & \alpha_{49} & \alpha_{510} & \alpha_{511} \\ \alpha_{56} & \alpha_{57} & \alpha_{58} & \alpha_{59} & \alpha_{510} & \alpha_{511} \\ \alpha_{66} & \alpha_{67} & \alpha_{68} & \alpha_{69} & \alpha_{610} & \alpha_{611} \end{pmatrix} \begin{bmatrix} \varepsilon_{emp_t} \\ \varepsilon_{tax_t} \\ \varepsilon_{dev_t} \\ \varepsilon_{rec_t} \\ \varepsilon_{bd_t} \\ \varepsilon_{debt_t} \end{bmatrix} + \begin{bmatrix} 1 & -\alpha_{11} & -\alpha_{12} & -\alpha_{13} & -\alpha_{14} & -\alpha_{15} \\ -\alpha_{21} & 1 & -\alpha_{22} & -\alpha_{23} & -\alpha_{24} & -\alpha_{25} \\ -\alpha_{31} & -\alpha_{32} & 1 & -\alpha_{33} & -\alpha_{34} & -\alpha_{35} \\ -\alpha_{41} & -\alpha_{42} & -\alpha_{43} & 1 & -\alpha_{44} & -\alpha_{45} \\ -\alpha_{51} & -\alpha_{52} & -\alpha_{53} & -\alpha_{54} & 1 & -\alpha_{55} \\ -\alpha_{61} & -\alpha_{62} & -\alpha_{63} & -\alpha_{64} & -\alpha_{65} & 1 \end{bmatrix}^{-1} \begin{pmatrix} \beta_1 & 0 & 0 & 0 & 0 & 0 \\ 0 & \beta_2 & 0 & 0 & 0 & 0 \\ 0 & 0 & \beta_3 & 0 & 0 & 0 \\ 0 & 0 & 0 & \beta_4 & 0 & 0 \\ 0 & 0 & 0 & 0 & \beta_5 & 0 \\ 0 & 0 & 0 & 0 & 0 & \beta_6 \end{pmatrix} \begin{bmatrix} \varepsilon_{emp_t} \\ \varepsilon_{tax_t} \\ \varepsilon_{dev_t} \\ \varepsilon_{rec_t} \\ \varepsilon_{bd_t} \\ \varepsilon_{debt_t} \end{bmatrix} \quad (3.73)$$

Therefore, the reduced VAR is expressed as:

$$\begin{bmatrix} emp_t \\ tax_t \\ dev_t \\ rec_t \\ bd_t \\ debt_t \end{bmatrix} = \begin{bmatrix} \varphi_{10} \\ \varphi_{20} \\ \varphi_{30} \\ \varphi_{40} \\ \varphi_{50} \\ \varphi_{60} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} & \gamma_{13} & \gamma_{14} & \gamma_{15} & \gamma_{16} \\ \gamma_{21} & \gamma_{22} & \gamma_{23} & \gamma_{24} & \gamma_{25} & \gamma_{26} \\ \gamma_{31} & \gamma_{32} & \gamma_{33} & \gamma_{34} & \gamma_{35} & \gamma_{36} \\ \gamma_{41} & \gamma_{42} & \gamma_{43} & \gamma_{44} & \gamma_{45} & \gamma_{46} \\ \gamma_{51} & \gamma_{52} & \gamma_{53} & \gamma_{54} & \gamma_{55} & \gamma_{56} \\ \gamma_{61} & \gamma_{62} & \gamma_{63} & \gamma_{64} & \gamma_{65} & \gamma_{66} \end{bmatrix} \begin{bmatrix} emp_{t-1} \\ tax_{t-1} \\ dev_{t-1} \\ rec_{t-1} \\ bd_{t-1} \\ debt_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{emp_t} \\ \varepsilon_{tax_t} \\ \varepsilon_{dev_t} \\ \varepsilon_{rec_t} \\ \varepsilon_{bd_t} \\ \varepsilon_{debt_t} \end{bmatrix} \quad (3.74)$$

Where

$$\begin{bmatrix} \mu_{emp_t} \\ \mu_{tax_t} \\ \mu_{dev_t} \\ \mu_{rec_t} \\ \mu_{bd_t} \\ \mu_{debt_t} \end{bmatrix} = \begin{bmatrix} 1 & -\alpha_{11} & -\alpha_{12} & -\alpha_{13} & -\alpha_{14} & -\alpha_{15} \\ -\alpha_{21} & 1 & -\alpha_{22} & -\alpha_{23} & -\alpha_{24} & -\alpha_{25} \\ -\alpha_{31} & -\alpha_{32} & 1 & -\alpha_{33} & -\alpha_{34} & -\alpha_{35} \\ -\alpha_{41} & -\alpha_{42} & -\alpha_{43} & 1 & -\alpha_{44} & -\alpha_{45} \\ -\alpha_{51} & -\alpha_{52} & -\alpha_{53} & -\alpha_{54} & 1 & -\alpha_{55} \\ -\alpha_{61} & -\alpha_{62} & -\alpha_{63} & -\alpha_{64} & -\alpha_{65} & 1 \end{bmatrix}^{-1} \begin{pmatrix} \beta_1 & 0 & 0 & 0 & 0 & 0 \\ 0 & \beta_2 & 0 & 0 & 0 & 0 \\ 0 & 0 & \beta_3 & 0 & 0 & 0 \\ 0 & 0 & 0 & \beta_4 & 0 & 0 \\ 0 & 0 & 0 & 0 & \beta_5 & 0 \\ 0 & 0 & 0 & 0 & 0 & \beta_6 \end{pmatrix} \begin{bmatrix} \varepsilon_{emp_t} \\ \varepsilon_{tax_t} \\ \varepsilon_{dev_t} \\ \varepsilon_{rec_t} \\ \varepsilon_{bd_t} \\ \varepsilon_{debt_t} \end{bmatrix} \quad (3.75)$$

Rearranging,

$$\begin{bmatrix} 1 & -\alpha_{11} & -\alpha_{12} & -\alpha_{13} & -\alpha_{14} & -\alpha_{15} \\ -\alpha_{21} & 1 & -\alpha_{22} & -\alpha_{23} & -\alpha_{24} & -\alpha_{25} \\ -\alpha_{31} & -\alpha_{32} & 1 & -\alpha_{33} & -\alpha_{34} & -\alpha_{35} \\ -\alpha_{41} & -\alpha_{42} & -\alpha_{43} & 1 & -\alpha_{44} & -\alpha_{45} \\ -\alpha_{51} & -\alpha_{52} & -\alpha_{53} & -\alpha_{54} & 1 & -\alpha_{55} \\ -\alpha_{61} & -\alpha_{62} & -\alpha_{63} & -\alpha_{64} & -\alpha_{65} & 1 \end{bmatrix} \begin{bmatrix} \mu_{empt_t} \\ \mu_{tax_t} \\ \mu_{dev_t} \\ \mu_{rec_t} \\ \mu_{bd_t} \\ \mu_{debt_t} \end{bmatrix} = \begin{bmatrix} \beta_1 & 0 & 0 & 0 & 0 & 0 \\ 0 & \beta_2 & 0 & 0 & 0 & 0 \\ 0 & 0 & \beta_3 & 0 & 0 & 0 \\ 0 & 0 & 0 & \beta_4 & 0 & 0 \\ 0 & 0 & 0 & 0 & \beta_5 & 0 \\ 0 & 0 & 0 & 0 & 0 & \beta_6 \end{bmatrix} \begin{bmatrix} \varepsilon_{empt_t} \\ \varepsilon_{tax_t} \\ \varepsilon_{dev_t} \\ \varepsilon_{rec_t} \\ \varepsilon_{bd_t} \\ \varepsilon_{debt_t} \end{bmatrix} \quad (3.76)$$

Which gives the matrix in $A\mu_t = \beta\varepsilon_t$ model.

The essence of structural VAR is to use theoretical restrictions to identify the shocks. These restrictions are given from the theoretical model adopted to assess the relationship among the variables. Since the overall number of elements of the structural form matrices A and B is $2K^2$, it follows that $K^2 + \frac{K(K-1)}{2}$ restrictions are required to identify the full model. However, setting one of the matrices A or B equal to the identity matrix, requires that $\frac{K(K-1)}{2}$ restrictions remain to be imposed.

The current study therefore imposed 15 restrictions on matrix A which is the same as imposing restrictions to the contemporaneous relationships among the endogenous variables of the structural VAR. To get the effect of structural shocks on the dependent variables, the study recovered the parameters of the structural VAR from the estimated reduced VAR through triangular cholesky decomposition which makes structural VAR to be over identified. Cholesky decomposition involves restricting the matrix of contemporaneous coefficients to an upper triangular matrix whose effect is that one variable is assumed not to have a contemporaneous effect on the other(s). Based on theory, the A matrix used in the structural VAR model was specified as follows:

$$\begin{bmatrix} 1 & 0 & 0 & 0 & \alpha_{15} & 0 \\ 0 & 1 & 0 & 0 & \alpha_{25} & 0 \\ \alpha_{31} & -\alpha_{32} & 1 & -\alpha_{34} & -\alpha_{35} & -\alpha_{36} \\ 0 & -\alpha_{42} & -\alpha_{43} & 1 & 0 & 0 \\ 0 & -\alpha_{52} & -\alpha_{53} & -\alpha_{54} & 1 & 0 \\ 0 & 0 & -\alpha_{63} & -\alpha_{64} & \alpha_{65} & 1 \end{bmatrix} \quad (3.77)$$

3.8.3 Impulse Response Analysis

Impulse response functions show the effects of shocks on the adjustment path of the variables. The coefficients estimates were used in the derivation of impulse responses and forecast error decomposition. Impulse response functions production uses estimates from the estimated VAR model that involves nonlinear functions of the estimated VAR parameters. Impulse response analysis links the current value of the error term to the future values of Y_t or equivalently, the current and past values of the error term to the current values of Y_t . An impulse response enables one trace the effect of one time shock to one of the innovations on the current and future values of the endogenous variable. The impulse responses are obtained from a vector auto regression moving average (VARMA) given as:

$$IRF(t,h,d_i)=E \left[Y_{t+h} | u_{t+j} = \begin{cases} d_i & \text{if } j = 0 \\ 0 & \text{if } j \in (1, h) \end{cases}; \pi_t \right] - E[Y_{t+h} | u_{t+j} = 0 \forall j \in (0, h); \pi_t] \dots\dots\dots(3.78)$$

According to equation (3.78) IRFs measure the reaction of the system's variables at $t+h$, for $h=0, \dots, H$ to a shock of the disturbance vector of d_i . π_t is the information available at t which is the set of lagged dependent variable vectors up to lag order

ρ . The i^{th} structural shock corresponds to the i^{th} column of \hat{A}^{-1} where each row corresponds to the response.

3.8.4 Variance Decomposition

Another way to disentangle the effects of various shocks is to consider the contribution of each type of shock to the forecast error variance. Variance decomposition separates the variations in an endogenous variable into the component shocks to the VAR. Thus variance decomposition provided information about the relative importance of each random innovation in affecting the variables in the VAR.

The variance decomposition indicated the amount of information each variable contributed to the other variables in the auto regression. It determined how much of the forecast error variance of each of the variables could be explained by exogenous shocks to the other variables.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

This chapter provides the analysis of data and study findings. First, descriptive statistics for variables used are provided. Second, time series properties of the data are examined and explained. The chapter finally presents empirical results and discussions. Empirical findings have been presented as per the study objectives.

4.2 Descriptive Statistics

The study analyzed the data for all the variables in order to discern its characteristics prior to estimation. This involved the determination of the mean, median, maxima, minima and the standard deviation of the variables. Table 4.1 gives a summary of the descriptive statistics for the variables used in the study.

Table 4.1: Descriptive Statistics

Variable	Unit of Measurement	Mean	Maximum	Minimum	Std Dev.
Employment in agriculture	Number	284,309	342,504	204,524	42,480.80
Employment in manufacturing	Number	194,170	300,837	82,256	62,613.31
Employment in wholesale & retail	Number	102,526	239,846	32,461	54,993.04
Employment in ICT	Number	32,552	110,604	2481	31,664.19
Employment in finance	Number	32,843	77,363	9,409	16,725.31
Employment in tourism	Number	34,740	77,363	7,705	20,653.53
Agriculture's GDP	Kshs millions	303,085.10	2,334,147	1,445.80	523,722.50
Manufacturing GDP	Kshs millions	119,258.30	657,950	1,243.20	178774.2
Wholesale and Retail GDP	Kshs millions	110,191.70	520,583	867.8	139150.3
Financial sector's GDP	Kshs millions	74,475.58	504,688	421.4	117103.8
ICT's GDP	Kshs millions	22,076.30	68,853	180.8	24682.82
Tourism's GDP	Kshs millions	6,682.00	22,130.30	47.38	7393.36
Inflation rate	Percentage	12.11	45.98	1.55	8.21
Exchange Rate	Kshs/US dollar	43.19	101.05	7.02	32.05
Trade Openness	Percentage	57.92	74.57	44.38	6.9
Population density	People per sq.km	47	83	20	19
Average real wage	Kshs	324,391.81	515,712	229,654.32	79,637.40
Foreign direct investment	Percentage	0.86	2.73	0.04	0.7
Total Wage Employment	Number	1,472,466	2,553,500	644,500	504,738.10

Table 4.1 Continued

Variable	Unit of Measurement	Mean	Maximum	Minimum	Std Dev.
Total tax revenue	Kshs millions	229,920.50	1,276,960	2095.6	229,920.50
Real GDP	Kshs millions	1,638,972	4,300,302	527,290	959,765.40
Development expenditure	Kshs millions	867,96.82	625,780.10	594.66	163,728.80
Budget deficit	Kshs millions	-65965.96	11495	-476,924.40	126,471.30
Recurrent Expenditure	Kshs millions	272,648.80	1,657,215	2,266.34	423,964.40
Debt	Percentage	47.08	82.09	23.8	13.52
Labour force Participation	Percentage	74.67	84.12	56	27.11

Source: Derived from collected Data

The data presented in Table 4.1 shows that on average, the employment in the agriculture sector was 284,309 employees with maximum and minimum values being 342,504 workers and 204,524 workers respectively. The employment in manufacturing sector averaged 194,170 workers. The sector had a maximum of 300,837 workers and a minimum of 82,256 workers. Employment in the wholesale and retail trade sector ranged from 32,471 employees to 239,864 workers with an average of 102,526 workers.

Employment in the financial sector averaged 32,843 workers. The sector had a maximum of 75,673 employees and a minimum of 9,409 employees. In the information and communications sector, the employment mean was 32,552 workers. Employment in the tourism sector ranged from 7,705 workers to 77,363 workers with an average of 34,740 employees. On average, the sample statistics

were quite low compared to MTP I (2008-2012) target of creating a total of 3.7 million new jobs over the Plan period and the Second Medium Term Plan (MTP II, 2013-2017) target of creating 1 million new jobs annually. This therefore, means that most of the jobs being created were in the informal sector, where most jobs are characterized by underemployment and low productivity. Also, in terms of employment, the sample had markedly dissimilar sectors a fact consistent with the population under study.

In Table 4.1, the average aggregate wage employment for the period under consideration was 1,472,466 persons. The total wage employment had a maximum of 2,553,500 workers and a minimum of 644,500 workers. The growth in wage employment over the study period was as a result of the Kenyan government efforts to create employment opportunities to absorb the country's growing labour force. This was achieved through various short, medium and long-term employment creation measures like Kenyanization Programme, tripartite agreements, active labour market policies, public works programmes, foreign employment, and rural development over the plan period (Omolo, 2013).

Trade openness was used to assess the impact of international trade on employment intensity. Trade openness was given as a ratio of the sum of exports and imports to the GDP and averaged 57.92 per cent with a maximum of 74.57 per cent and a minimum of 44.38 per cent. The level of trade openness experienced over the period of study means that Kenya has been open to international trade. The results are

consistent with World Bank (2016) which established that Kenya has subscribed to an open trade policy.

Foreign Direct Investment was measured as a percentage of investments inflows to GDP. The estimation results presented in Table 4.1 show that FDI ranged from 0.04 per cent to 2.73 per cent with an average of 0.86 per cent. The estimation results reveal that FDI inflows to Kenya have been highly volatile. This volatility could be attributed to low confidence of investors as a result of insecurity and political instability when FDI inflows were quite low as shown by a minimum value of 0.04 per cent. On the other hand, high FDI inflows could be attributed to improved investment environment through implementing various macroeconomic reforms.

Population density in the country ranged between 20 people per square kilometre of land and 83 people per square kilometre of land with a mean of 47 people per square kilometre of land. The sample population density mean was low compared to the country's projected population density mean of 73.9 people per square kilometre in 2014 (Republic of Kenya, 2014a).

Exchange rate was used to reveal the impact of external shocks on employment elasticity. On average the exchange rate was 43.19 Kshs/US\$ with maximum and minimum values of 101.05 Kshs/US \$ and 7.02 Kshs/US\$ respectively. Therefore, the exchange rate over the study period was volatile. This implies that the country experienced low, mild, and high exchange rates at some points in the study period.

The rate of inflation for the period under study ranged from 1.55 per cent to 45.98 per cent with an average of 12.43 per cent a standard deviation of 12.15. Overall, therefore, Kenya experienced mild, rapid and galloping inflation rates. The average rate of inflation was more than a single digit which was higher than the one envisaged in the EAC Monetary Union Protocol. According to this protocol, headline inflation rate should be about 8 per cent under macroeconomic convergence criteria (EAC, 2013).

Kenya's output level was captured by real GDP. Over the period 1970-2016, the real GDP averaged Kshs.1, 638,972 million. The real GDP had a maximum of Kshs. 4,300,302 million and a minimum of Kshs. 527,290 million. The growth in real GDP over the study period could be attributed to the various development plans and strategies implemented by the government over the study period.

Kenya's debt was measured as a ratio of the total public debt to GDP. The mean debt averaged 47.08 per cent with a maximum debt ratio of 82.09 per cent recorded in 1993 and a minimum debt ratio of 23.8 per cent which was recorded in 1977. The high debt ratio experienced in 1993 was attributed to the depreciation of the local currency and the high inflation rates at the time (Rwegasira & Mwegu, 2003). The mean debt ratio was also high compared to the country's target of reducing debt to GDP ratio to 39.2 per cent by 2017 (Republic of Kenya, 2015).

Over the period 1970-2016, the average of agriculture sector's contribution to GDP was 303,085.1 million shillings with maximum and minimum values of 2,334,147 million shillings and 1,445.80 million shillings respectively. Over the study period,

the agricultural sector was the highest contributor to GDP among the priority sectors. This could be explained by the fact that agriculture contributes directly to over a quarter of the GDP and provides a source of livelihood to the majority of Kenyans (Republic of Kenya, 2008). The contribution of manufacturing sector to GDP averaged 119,258.3 million shillings. The sector had a maximum of 657,950 million shillings and a minimum of 1,243.20 million shillings. The contribution of the wholesale and retail trade sector to GDP ranged from 867.80 million shillings to 520,583 million shillings with an average of 110,191.7 million shillings.

From Table 4.1, the financial sector contribution to GDP averaged 74,475.58 million shillings. The sector had a maximum of 504,688 million shillings and a minimum of 421.40 million shillings. The tourism sector's contribution to GDP ranged from 47.38 million shillings to 22,130.30 million shillings with an average of 6,682 million shillings. The tourism sector registered the lowest contribution to GDP over the study period among the priority sectors. This could be as a result of negative publicity and insecurity that the tourism sector has received. The major sources of insecurity in the country have been associated with political instability and terrorist threats (Republic of Kenya, 2008).

The summary statistics presented in Table 4.1 further shows that on average, total tax revenue had a mean of Kshs 229,920.5 million. However, the total revenue varied over the period from Kshs. 2,095.60 million to Kshs. 1, 276,960 million with a standard deviation of Kshs. 328,972 million. The main factors contributing to an improved tax revenue performance over the period were changes in tax legislation

and tax administration undertaken by the Kenyan government. These measures included introducing the sales tax in 1973 and the capital gains tax in 1975 so as to widen the tax base. Other measures included the Tax Modernization Programme (TMP), which took place between 1986 and 2002. The TMP aimed at raising the tax revenue from 22 to 28 per cent of GDP and improving economic efficiency of the tax system through lowering and rationalization of tax rates (Mutua, 2012).

On average, development government expenditure was Kshs 86,796.82 million with maximum and minimum values being 625,780.1 million and Kshs 594.66 million respectively. The recurrent government expenditure ranged from Kshs 2,266.34 million to Kshs 1,657,215 with an average of Kshs 272,648.8. On average, the recurrent expenditure was more than development expenditure over the period of study. This could be attributed to different government efforts aimed at addressing the country's employment challenge. The government has created many jobs by playing the role of an employer of last resort (Omolo, 2013). The difference between development and the recurrent expenditure could also be explained by the burgeoning public wage bill due to the establishment of county governments by the constitution in 2010.

4.3 Time Series Property Results

Before the estimation of empirical models for the various objectives, time series property tests were conducted. This was to ensure that data was in a form that could ensure validity of the results.

4.3.1 Unit Root Test Results

Unit root tests for all the variables were conducted so as to establish the order of integration. Unit root tests whether a time series variable is non-stationary and possesses a unit root. Each of the series was tested for presence of a unit root based on Clemente-Montañés Reyes (CMR) test. The CMR test was preferred to other unit root tests as it allows for testing of two structural breaks within the series (Perron & Zhu, 2005). According to Perman and Byrne (2006), structural breaks can have a permanent effect on the pattern of the series. Therefore, testing for unit roots while allowing for structural breaks prevents the test results from a bias that reduces the ability to reject a false unit root null hypothesis. The CMR test also endogenously determines when the possible break occurred (Perman & Byrne, 2006).

The test results for all the variables are reported in Table A1, Table A2 and Figures A1 to A47 of Appendix 2 and Appendix 4 respectively. The CMR test has a null hypothesis of presence of a unit root with structural break(s). Therefore, a rejection of null hypothesis would imply that the series in question was stationary. The CMR test results are based on two models. The AO model which assumes that changes takes place rapidly allowing for a break in the slope and the IO model where changes are assumed to take place gradually and allows for a break in both the intercept and the slope (Clemente *et.al*, 1998).

The test statistic for CMR unit root is the minimum t -statistic. The estimation results of the CMR unit root test indicate that test statistics for variables GDP,

inflation rate, FDI, development expenditure, budget deficit, wage rate, employment elasticity, agriculture's GDP and tourism's GDP were statistically significant at 5 per cent level. This is because the minimum t - value for these variables were smaller than the critical value of -5.490 at 5 per cent significance value. Thus, according to CMR unit root test, the null hypothesis of presence of a unit root with structural break(s) for variables GDP growth rate, inflation rate, FDI, development expenditure budget deficit, wage rate, employment elasticity, agriculture's GDP and tourism's GDP was rejected and the alternative hypothesis that the series are stationary was not rejected. This implies that these variables were stationary at levels suggesting that they are integrated of order zero, $I(0)$.

Test statistic for variables population density, exchange rate, labour force participation rate, debt, recurrent expenditure, tax revenue, trade openness, employment in agriculture, employment in manufacturing, employment in wholesale and retail trade, employment in information and communication, employment in financial sector employment in tourism, manufacturing GDP, financial sector's GDP, information and communication GDP and wholesale and retail sectors GDP were not statistically significant at 5 per cent significance level. This means that the variables were not stationary at levels. Thus, according to CMR unit root test, these variables had at least one unit root and required to be differenced to become stationary. The series were, however, stationary at first difference and therefore integrated of order one, $I(1)$ as shown in Table A2 of Appendix 2.

The structural breakpoints for key macro-economic variables in the series coincided with key economic developments in the country. For instance, the break points for FDI under the AO model coincided with high capital inflows in the country in 1979 due to Kenya's central position in the larger East African Community (EAC) and the Common Market for Eastern and Southern Africa (COMESA) (Mvungi, 2002). The Structural break in 2007 coincided with the post-election violence that occurred in that year. The breakpoints for FDI under IO model also coincided with the collapse of EAC in 1977 and political instability due to land clashes of 1992.

The AO model picked 1991 and 1996 as the optimal break dates for inflation. The break dates under IO model for inflation were 1991 and 1993. The breakpoints under inflation for both AO and IO models could be explained by the political instability and the excess liquidity experienced in the country for the period 1991 to 1996. There was an expansion in liquidity held by commercial banks and the average liquidity ratio almost doubled the statutory requirement in 1992–1996 (Ngugi & Kabubo, 1998).

The years 1991 and 2007 were picked as the break dates for the variable exchange rate. The break date in 1991 could be attributed to the political instability and the high inflation rate of 20.084 per cent experienced in the country at the time. The break date in 2007 could be explained by the post-election violence of 2007. The breakpoint under AO model for exchange rate coincided with weakening of the Kenyan shilling against major trading currencies due to economic slowdown in Europe (Euro crisis) in 2011 (UNCTAD, 2012).

The break date for GDP growth under the AO model in 1977 coincided with a high economic growth rate of 9.45 that was accounted for by the effects of the favorable change in terms of trade in the country. The break point for in GDP in 1990 coincided with a sharp rise in oil prices and renewed decline in coffee prices. The innovational outlier breakpoint for GDP in 2000 occurred when the Kenyan economy registered a very low economic growth rate of 0.54 per cent (Republic of Kenya, 2003).

4.4 Empirical Results

This section presents the study findings based on the study objectives.

4.4.1 Employment Elasticities in Priority Sectors in Kenya

The first objective of the study was to estimate the magnitude of employment elasticities in priority sectors in Kenya. To accomplish this, a regression model of a double-log linear equation specified in equation 3.39 was estimated for each of the priority sector. The priority sectors are the ones envisioned in the *Kenya Vision 2030*. Equation 3.39 related employment per sector to its sectoral GDP. The statistic of concern was employment elasticity which gave the percentage change in employment due to a 1 per cent change in GDP. The log linear method of estimating elasticities was preferred to the arc method since the method provides more stable values, which are useful for economic policies. According to Islam and Nazara (2000), employment elasticities calculated using arc method tend to exhibit a great deal of instability and may therefore be inappropriate for

comparative purposes. The estimation results from this analysis are presented in Table 4.2.

Table 4:2: Employment Elasticities for Priority Sectors in Kenya from 1970-2016

Sector	Coefficient	t-statistic	P-value	Adjusted R-squared	F-statistic	Prob. (F-statistic)
Agriculture	0.115**	2.747	0.014	0.737	127.527	0.000
Tourism	0.187**	2.625	0.013	0.155	6.892	0.013
Information & Communication	0.412***	11.934	0	0.782	142.413	0.000
Finance	0.254**	2.432	0.014	0.667	91.346	0.000
Wholesale & Retail	0.233**	2.28	0.014	0.728	121.768	0.000
Manufacturing	0.199**	2.706	0.013	0.716	114.604	0.000

*Source: Derived from the collected data. Note: [***] and [**] and * denote significant at levels 1%, 5% and 10 % respectively.*

Empirical results in Table 4.2 show that the coefficient for the employment elasticity variable for agriculture sector was 0.115 and statistically significant at 5 per cent level. This implies that increase in GDP within agriculture sector by one per cent increased employment within the sector by 0.115 per cent. The employment elasticity within the sector was inelastic since a one per cent increase in the sector's GDP led to a less than proportionate increase in employment within the sector. The adjusted *R*-squared in the agriculture sector model of 0.737 meant that agriculture's GDP accounted for 73.7 per cent of the variations in employment within the sector. The *F*-statistic value of the agricultural sector model was 127.527 with a corresponding *p*-value of 0.000. Since the *p*-value of the *F*-statistic was less

than the significance level of 0.05, the null hypothesis that all slope coefficients are equal to zero was rejected.

The estimation results for the agriculture sector concurs with Jiun and Nga (2011), who found the employment elasticity for agriculture in Malaysia to range between 0.09 and 0.13 during the period 1970 to 2009. The results also concur with Leshoro (2014) who found employment elasticity in the agricultural sector in Zambia to be 0.03 for the period 1980 to 2011. The employment elasticity in the agricultural sector for Kenya was, however, much lower compared to the Sub Saharan Africa of 0.47 and 1.01 for both South Asia and North America for the period 1991 to 2009 (Crivelli *et.al*, 2012).

An employment elasticity coefficient of 0.115 is low compared to 0.7 recommended by Khan (2001) for developing countries. The low employment elasticity for agricultural sector could be attributed to the deterioration of infrastructure which has increasingly become a major hindrance to development in the agricultural sector (Republic of Kenya, 2010). A key concern in this regard is the expansion and proper maintenance of various modes of transport and communication for adequate coverage of the rural areas. Not only is the stock of rural infrastructure in poor condition and inadequate, but is also unevenly distributed leaving some high agricultural potential areas with little or no coverage. This in turn hinders promotion of agriculture as a commercial business leading to low employment opportunities.

The low employment yield of output growth in agricultural sector could also be attributed to inefficiencies in the supply chain resulting from limited storage capacity, lack of post-harvest services and poor access to input markets (Alila & Atieno, 2006). Kenyan farmers also face numerous direct and indirect taxes, which make agriculture less competitive internationally. The impact of these taxes, levies and fees distort market prices thus making farm produce uncompetitive in the domestic as well as in international markets (Republic of Kenya, 2010). The distortion in prices translates to low income for farmer and hence less job opportunities.

Low technology absorption capacity in the country could also have led to a low employment elasticity in the agricultural sector. Although Kenya has a well-developed agricultural research system, the use of modern science and technology in agricultural production is still limited which continue to constrain efforts for increasing agricultural productivity (Alila & Atieno, 2006).

Table 4.2 indicates that the tourism sector model had an adjusted *R*-squared coefficient of 0.155. The coefficient of adjusted *R*-squared in the tourism sector implied that only 15 per cent of the variations in employment within the sector were explained by changes in tourism's GDP. This could be explained by the fact that a big part of the budget in the tourism sector is used in marketing and branding the country as a tourist destination and for infrastructural developments within the sector (Republic of Kenya, 2013b). This may not have a direct impact on job creation. The *F*-statistic was 6.893 with a corresponding *p*-value of 0.013. Since

this p -value (0.013) was less than the critical value of 0.05, the model was fit for prediction. The coefficient for the employment elasticity variable for tourism sector was 0.19 and statistically significant at 5 per cent level. This implies that when GDP in the tourism sector increases by one per cent, employment within the tourism sector would increase by 0.19 per cent. The employment elasticity within the sector was, however, inelastic since a one per cent increase in tourism's GDP resulted in less than proportionate increase in employment within the sector. The results are consistent with Mouelhi and Ghazali (2014) who found an employment coefficient for tourism sector in Tunisia to be 0.82 during the period 1980 to 2012.

The low responsiveness of employment to output growth in the tourism sector in Kenya could be explained by the negative perception on security matters with respect to perceived threats of terrorism that has led to negative travel advisories against travel to Kenya. The negative travel advisories led to huge ripple effects within the sector due to cancellation of bookings by tourists to several parts of the country. The cancellations of flights and travels led to job cuts and job losses as thousands of employees within the tourism sector were made redundant (Republic of Kenya, 2013b). The negative travel advisories also had a direct impact on FDIs within the tourism sector. Investors were inclined to nullify their FDI in Kenya due to the rise of operating costs as a result of the increasing need of security measures, and the rise of recruiting costs due to missing incentives to work in terrorism-prone regions. This further contributed to the loss of job opportunities for tourism development initiatives.

According to Table 4.2, the adjusted R -squared for the ICT sector model was 0.782. This meant that 78.2 per cent of the variations in employment within the sector were influenced by changes in the sectors GDP. The F - statistic was 142.413 with a corresponding p -value of 0.00. This led to the rejection of the null hypothesis that the slope coefficient is equal to zero. The coefficient for the employment elasticity variable for ICT was 0.41 and statistically significant at 1 per cent level. This meant that a one per cent increase in GDP for ICT sector would lead to a 0.41 per cent increase in employment within the sector. The employment elasticity for the ICT sector was, however, much higher compared to the other priority sectors. Therefore, the ICT sector had the highest employment intensity of growth among other priority sectors over the study period.

The results are consistent with Sepehrdoust and Khodaei (2013), who established that a one per cent increase in ICT expenditures and GDP of the country led to an employment rate increase of 0.045 and 0.2 per cent respectively during the period 2000-2009 for selected Organization of Islamic Conference (OIC) member countries. The results, however, contradict Vivarelli and Pianta (2000) who found that in many countries, both developed and developing, have been experiencing structural unemployment originating from ICT. This is because ICT's contributes to the automation of processes, making some workers redundant.

The employment intensity of growth in the ICT sector could be associated with the government's aspiration under *Kenya Vision 2030* where the government recognizes ICT as a foundation for national development. The ICT sector has seen

tremendous progress in electronic cash transfer through mobile telephony platform as a result of which micro-credits and savings have been raised using the same platform. The sector has also witnessed developments of the planned national ICT infrastructure to improve universal access to ICT services. All major towns in the country have been connected through the National Optic Fibre Backbone Infrastructure (NOFBI) and government Common Core Network (GCCN). This in turn has increased the demand for internet and data services which has led to enhanced business activities and created job opportunities.

The high responsiveness of employment to output growth in the ICT sector as compared to the other priority sectors could also have been as a result of the government efforts in launching the digital jobs Programme. The government heightened its promotion activities to recruit youths for online work and ensured increased job opportunities in the sector from 1,000 in 2008 to 13,500 by 2012. The ICT sector even surpassed the sectoral target of generating 20,000 jobs annually in 2013/2014 with the sector generating 21,073 jobs (Republic of Kenya, 2014b).

The adjusted *R*-squared for the financial sector model was 0.667. This implies that 66.7 per cent of the variations in employment within the financial sector are accounted for by changes in the sector's GDP. The financial sector had a *F*-statistic of 91.346 with a corresponding *p*-value of 0.00. The coefficient for the employment elasticity variable for financial sector was 0.25 and statistically significant at 5 per cent level. This implies that a one per cent increase in financial sector's GDP would increase employment in the sector by 0.25 per cent. The results, however, contradict

Akinkugbe (2015), who found that the finance, insurance and business services sector in Zambia had relatively low employment elasticity, with each percentage increase in value added giving rise to negative growth in employment for the period under study.

The financial sector was the second most responsive after ICT sector compared to the other priority sectors in terms of employment yield of economic growth. One possible explanation for the sectors performance could be the introduction of mobile phone based banking. The development of mobile based payments has produced an expansion, involving new players from outside the banking system and led to many job opportunities that included mobile phone money transfer agents.

The employment elasticity in the financial sector was, however, inelastic. Inelastic employment elasticity means that a one per cent increase in financial sector's GDP led to a less than one per cent increase in employment within the sector. One possible explanation for the inelastic employment elasticity in the sector could be the large informal sector in the country that accounts for 83.1 per cent of total employment (Republic of Kenya, 2017). The informal sector is encompassed with low levels of usage for financial services and relatively few households make use of formal financial services to manage day-to-day cash-flows and most businesses are still heavily cash dependent.

The coefficient for the employment elasticity variable for manufacturing sector was found to be positive with a magnitude of 0.19 and statistically significant at 5 per

cent level. This implies that a one per cent increase in GDP for manufacturing sector would increase employment within the sector by 0.19 per cent. The value of the adjusted *R*-squared for the manufacturing sector model indicated that 71.6 per cent of the variations in employment within the sector were influenced by changes in the sector's GDP. The *F*-statistic was 114.6 with a corresponding *p*-value of 0.000. Since this *p*-value (0.000) was less than the critical value of 0.05, the model was fit for prediction. The results are consistent with Akinkugbe (2015) who found the employment elasticity in manufacturing sector for Zambia to be 0.9 between 1990-2008, 2.54 for the period 2000-2005 and 17.2 for the period 2005 to 2008. The results, however, contradict Padalino and Vivarelli (1997) who found elasticities in manufacturing sector to be negative for G-7 countries except for Japan over the 1980-1994 period.

The inelastic employment yield of output growth in the manufacturing sector could be explained by the structure of the manufacturing sector in the country. Almost about 95 per cent of manufacturing firms in Kenya are micro and small (KIPPRA, 2017). This means that most firms in the manufacturing sector are mainly informal offering high and increasing number of precarious jobs. Republic of Kenya (2016), also asserts that most of the MSE's die early, churn out jobs and create insecure jobs. The manufacturing sector in Kenya is also faced by increased competition from cheap imports into the local market, especially from China and India. In addition are challenges of increased incidences of illicit trade, including counterfeits and dumping (KIPPRA, 2017).

The coefficient for the employment elasticity variable for wholesale and retail trade was found to be positive with a magnitude of 0.199 and statistically significant at 5 per cent level. This implied that a one per cent increase in wholesale and retail sector's GDP would increase employment within the sector by 0.199 per cent. The estimation results also indicate that 72.8 per cent of the variations in employment within the sector were accounted for by changes in the sector's GDP. The *F*-statistic value of the wholesale and retail sector model was 121.768 with a *p*-value of 0.000. The *p*-value of 0.000 led to the rejection of the null hypothesis that all slope coefficients are equal to zero at 5 per cent significance level.

The estimation results are consistent with Sahin, Tansel & Berument (2013), who found that employment elasticity for Turkey was positive and statistically significant both in the short and long run for the period 1988 to 2008. The estimated results also concur with Akinkugbe (2015) who found the employment elasticity for wholesale, retail, hotels and restaurants to be elastic in Zambia for the period 1990 to 2008.

A possible explanation to the low responsiveness of employment to output growth in the wholesale and retail sector could be the fact that most enterprises in the sector are micro, small and medium establishments (MSME) in nature. Wholesale and retail accounts for more than half of the total persons working (Republic of Kenya, 2016). According to the Republic of Kenya (2016), a total of 2.2 million MSMEs have been closed since the year 2010 where most of the closed businesses were in wholesale and retail trade which accounted for 73.5 per cent of the total closures.

Consequently, this closure of business implies loss of job opportunities. This could also be partly attributed to increased competition in the sector, and the effects of e-commerce and online shopping.

4.4.2 Drivers of Employment Elasticities in Kenya

The second objective of this study sought to establish the drivers of employment elasticities in Kenya. Unit root tests results in Table 1 of Appendix 2 indicated that the variables used in objective two had mixed orders of integration, that is $I(0)$ and $I(1)$ suggesting that ARDL was the appropriate model for estimation. These variables included employment elasticity, average wage, exchange rate, inflation, labour force participation rate, population density, trade openness and FDI. The ARDL model was preferred due to its ability to estimate the long and short-run parameters of the model simultaneously for the avoidance of the problems posed by non-stationary time series data.

Pesaran and Shin (1999) showed that cointegrating systems can be estimated as ARDL models, with the advantage that the variables in the cointegrating relationship being either $I(0)$ or $I(1)$, without needing to pre-specify which are $I(0)$ or $I(1)$. Pesaran and Shin (1999), also note that unlike other methods of estimating cointegrating relationships, the ARDL representation does not require symmetry of lag lengths; each variable can have a different number of lag terms.

Before estimation of the ARDL, a bound test was estimated to determine whether the independent variables had a long-run relationship with the dependent variable.

The bound tests were estimated using the approach proposed by Pesaran and Shin (1999) for testing long run relationship among the variables expressed in equation 3.40. The F -statistic tests for the joint significance of lagged variables. If the F -statistic falls below the lower critical value (Lower bound), the null hypothesis of no long-run relationship is accepted irrespective of the orders of integration but if the F -statistic falls above the upper critical value (upper bound), the null hypothesis of no long-run relationship is rejected (Pesaran and Shin, 1999). However, if the F -statistic falls between the lower and upper critical values, any inference would be inconclusive and knowledge of the order of integration of the variables will be needed before conclusive inferences are made. The bound test results are shown in Table 4.3.

Table 4.3: ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	10.12100	7
Critical Value Bounds		
Significance	I(0) Bound (lower Bounds)	I(1) Bound (upper bounds)
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Source: Derived from collected data

The estimation results in Table 4.3 show an F -statistic value of 10.12 which is more than the upper bound value of 4.43 at one (1) per cent significance level thus rejecting the null hypothesis and concluding that there exists a long run relationship among the model variables. The results, therefore, justify the use of ARDL and ECM version of ARDL to derive the long run and short run relationships of the variables.

Before estimating the short and long run relationships of the variables, diagnostic tests were conducted to establish the ARDL statistical appropriateness. Equation 3.40 was employed to establish the optimal lag length and the goodness of fit. The adopted optimal lags by the Akaike's Information Criterion (AIC) automatic lag selection were (1, 2, 2, 0, 2, 0, 0, 2). The R-squared value was 95 percent. The estimated model had a F -statistic of 11.349 with a corresponding p -value of 0.0023. Since this p -value (0.0023) was less than the critical value of 0.5 at 5 per cent significance level, the null hypothesis of joint significance of the explanatory variables being equal to zero was rejected.

The LM serial correlation test and Breusch Pagan –Godfrey tests were used to test for the presence of serial correlation and heteroscedasticity respectively. The LM serial correlation and heteroscedasticity results are shown in Table A6 and Table A7 of Appendix 3 respectively. The estimated results gave an observed *Chi square* value of 1.0542 with a corresponding p -value of 0.54. The null hypothesis that there is no serial correlation was thus accepted at five per cent level. The p -value (0.4332)

for the *Chi square* in Breusch Pagan Godfrey test also led to the acceptance of the null hypothesis of no heteroscedasticity at 5 per cent level.

Objective two was therefore realized by estimating the Auto regressive Distributed Lag (ARDL) model given in equation 3.40 for long run and an Error Correction Model (ECM) version of ARDL for short run sources of employment elasticities. The short run estimation output are given in Table 4.4. The estimation results extracted from Table 4.4 are discussed in section 4.3.2.1.

4.4.2.1 Short Run Sources of Employment Elasticities in Kenya

The short run estimation was done in two stages. The first stage involved estimating the reduced cointegrating ARDL in equation 3.40. The residuals got from estimation were then lagged once (ECT-1) and were used in the second stage to estimate the ECM version of ARDL model. The short-run results represent the coefficients of the differenced explanatory variables and they give short-run growth effects. The coefficients describe short-term growth in employment elasticity resulting from previous period's growth in the independent variables. The results are presented in Table 4.4.

Table 4.4: Short-Run Effects of Various Variables on Employment Elasticities

Dependent Variable: Employment Elasticity			
Regressors	Coefficients	t-Statistics	Probability value
Δ Employment elasticity lagged once	0.521200***	3.494695	0.0017
Δ Average Wage	-0.001243**	-2.55348	0.0166
Δ Average Wage lagged once	0.004276	1.081493	0.2890
Δ Average Wage lagged twice	0.001528	0.277019	0.7839
Δ Exchange rate	-0.049085	-0.440872	0.2215
Δ Exchange rate lagged once	0.016436	0.783014	0.4404
Δ Exchange rate lagged twice	0.027306	1.542330	0.1346
Δ Inflation	-0.110033***	-2.73385	0.0094
Δ Labour Force Participation rate	0.04566**	2.621162	0.0156
Δ Labour Force Participation Rate lagged once	0.080886**	2.026210	0.0192
Δ Labour Force Participation Rate lagged twice	0.293105***	3.916707	0.0007
Δ Population Density	0.017609***	2.042731	0.0082
Δ Trade Openness	0.000975	0.679254	0.9463
Δ FDI	-0.718165	-	1.567219
Δ FDI lagged once	1.179770**	2.468262	0.0486
Δ FDI lagged twice	0.896711*	2.222010	0.0680
Error Correction Term	-1.921665***	-3.78479	0.0000

*Source: Derived from collected Data. Note: [***], [**] and * denote significant levels at 1%, 5% and 10% respectively. Δ denotes the first difference operator*

Table 4.4 indicates that only short-run coefficients for variables first lag of employment elasticity, average wage, inflation rate, labour force participation rate, first and the second lag of labour force participation rate, population density and the first and the second lag of FDI were statistically significant. This reflects presence of short-run relationship between employment elasticity and these variables.

Employment elasticity was the dependent variable and denoted the overall growth of employment elasticity at time t . The annual employment elasticity was calculated by dividing the percentage change in employment by the corresponding percentage change in GDP during a given period to provide a time variability which is not possible with OLS estimates. The estimation results presented in Table 4.4 shows that the coefficient of the first lag of employment elasticity change is positive and statistically significant at one per cent level of significance. The change in employment elasticity in the current period impacts positively the change in employment elasticity after one period.

Inflation rate is viewed as a proxy for the level of economic stability in an economy and it is theoretically expected to have a negative effect on employment yield of economic growth. The coefficient of inflation was -0.11 and statistically significant at 1 per cent level. This implies that a one per cent increase in inflation rate will reduce employment elasticity by 0.11 per cent. The study results concur with Kapsos (2005), Crivelli *et.al* (2012) and Mouelhi and Ghazali (2014) who found the rate of inflation to be negatively related with employment elasticity. Inflation

can be expected to have negative effect on employment yield of output growth. This is because high rates of inflation mean high production costs in terms of high prices for inputs, raw materials and even labour. Instability in macroeconomic variables would thus imply limiting investment opportunities that would in turn create employment opportunities.

The population density variable had a coefficient of 0.031. The coefficient was positive and statistically significant at 1 per cent level. Therefore, a one per cent increase in the population density will cause a 0.031 increase in employment elasticity. This implies that increase in the population density growth rate enhanced employment yield of output growth. The study results concur with Adegboye, Egharevba and Edafe (2017), but contradict with Crivelli *et.al* (2012) who found population density to be negatively correlated with employment elasticity. The implication of the results is that in areas with high population density, the level of unemployment is also very high. This could mean that any change in employment growth would have a bigger impact than in areas which are densely populated.

The annual average wage had a negative sign for its coefficient in the current period and statistically significant at 5 per cent level. The magnitude of annual average wage was -0.0012; this indicates that a one per cent increase in annual average wage will lead to a decrease in employment elasticity by 0.0012 per cent. The implication is that average wages have an indirect relationship with employment elasticity. The results concur with Mouelhi and Ghazali (2014) that higher average annual real wages reduce employment elasticity. However, as the period moves into the future,

the coefficient becomes insignificant. A one-unit growth of average wage affects employment elasticity by 0.004 one period later and 0.001 two periods after. The study findings imply that higher average annual real wages reduce employment-growth elasticity within the current year. This is because higher wages and non-wage benefits increases the cost of production and could constrain growth-induced employment opportunities.

Labour force participation rate was included in the model to assess the effects of labour supply on employment elasticity. The coefficient of labour force participation variable was found to be positive with a magnitude of 0.045 and statistically significant at 5 per cent level in the current period. The coefficients of the first and second lags of labour force participation variable were also positive and statistically significant at 5 and 1 per cent levels respectively. The magnitude of effect increases as the variable move into the future as indicated by higher value of the coefficient as compared to the previous value. This implies that an expanding supply of labour leads to a more employment-intensive growth. This concurs with the classical theoretical prediction that higher labour supply will lead to lower average wages and ultimately lead to an increase in demand for labour input (Ambrosi, 1986). The results are consistent with Chan (2001) who found a positive and significant relationship between labour force participation rate and employment elasticity. The estimation results, however, contradict Crivelli (2012), who found labour force participation rate to be negatively correlated with employment-output elasticities for advanced countries.

A probable explanation for the relationship between labour force participation rate and employment elasticity could be the existence of a dualistic economy in Kenya where there exists a big difference between formal sector and informal sector wages due to the existence of labour market imperfections. The rates of rural to urban migration have tended to exceed the absorptive capacity of the modern sector, leading to the growth in the informal sector. This means that employment growth would be responsive to any slight change in the growth of labour force. Another probable explanation could be that population growth stimulates technological progress and makes possible the realization of economies of scale that provide incentives for the adoption of more efficient techniques and institutional arrangements (Kawagoe, Hayami and Ruttan, 1985). This would thus imply that population growth promotes development by increasing the economy's productive capacity which in turn create employment elasticities.

The coefficient of foreign direct investment variable was found to be negative with a magnitude of -0.718 and was statistically insignificant at all three levels in the current period. The magnitude of the first lag of FDI was 1.179 and statistically significant at 5 per cent level. The magnitude of the second lag was 0.896 and statistically significant at 10 per cent level. This implied that a unit increase in foreign direct investment increases employment elasticity by 0.1179 in the first year and 0.896 in the second year respectively. The increase in FDI in the current period affects employment elasticity after one period and also two periods later. The study results concurs with Adegboye, Egharevba, & Edade (2017), who found that lagged values of FDI had a positive impact on employment elasticity in Sub-Saharan

Africa. A probable explanation could be the bureaucratic procedures involved in the release of funds from abroad. Even if the funds were to be released and invested immediately, the production in the affected sectors of the economy will only be realized with a lag since it takes time to establish the investments. Foreign direct investment also generates employment through forward and backward linkages with domestic firms.

Table 4.4 reveals that the coefficient of the trade openness variable though positive with a magnitude of 0.0009, was not statistically significant at all the three levels of significance. The results concur with (Bruno, Falzoni, & Helg, 2003) who did not find any statistically significant relationship between trade openness and labour demand elasticity. The results, however, contradict Crivelli (2012), who found that employment elasticities tend to be higher in more advanced and closed economies. Despite the insignificant relationship between trade openness and employment elasticity, the positive relationship among the two variable is consistent with the trade theory. Wood (1999), ascertains that trade openness can lead to an increase in labour demand in labour-abundant countries due to comparative advantage. This in turn is expected to increase labour-demand elasticities as labour comes under pressure due to stiffer competition in the goods and labour markets.

Just like inflation, exchange rate was also used in empirical analysis as an indicator for assessing macroeconomic stability. The coefficient of exchange was found to be negative and statistically insignificant at all levels in the current period. The coefficients of the first and second lags of exchange rate were, however, positive

but also statistically insignificant at the three levels of significance. The study results contradict Mouelhi and Ghazali (2014) who found a negative and highly statistically significant relationship between exchange rate and employment elasticities in Tunisia.

The co-efficient of the error term or the adjustment factor had a magnitude of -1.921 and was statistically significant at 5 per cent level. The fact that the error correction term was negative provides evidence about the existence of a long-run association among the variables. The coefficient of the error term showed the proportion of the current changes in employment elasticity that were explained by the disequilibrium error in the previous period.

4.4.2.2 Long Run Sources of Employment Elasticities in Kenya

The long run coefficients of the determinants of employment elasticities were extracted from table A2.3. The coefficients showed how employment elasticities reacted to a permanent change in the independent variables. The long run results are given in Table 4.5.

Table 4.5: Long-Run Effects of Various Variables on Employment Elasticities

Dependent Variable	Employment elasticities		
	Coefficients	t-Ratio	Probability
Average Wage	-0.000002	-1.389820	0.1759
Exchange Rate	-0.143605**	-2.397212	0.0335
FDI	0.061486***	4.205235	0.0003
Inflation	-0.005741	-0.733607	0.4695
Labour Force Participation Rate	0.009164	0.966389	0.3424
Population Density	0.053665**	2.604860	0.0404
Trade Openness	-0.000507	-0.068022	0.9463
C	-24.207072***	-4.086920	0.0004

*Source: Derived from collected Data. Note: [***] and [**] denote significant levels at 1%, and 5% respectively.*

Table 4.5 indicates that only long run coefficients for variables exchange rate, FDI, and population density were statistically significant. This reveals presence of long run relationship between employment elasticity and these variables.

The coefficient of exchange rate variable was found to be negative with a magnitude of 0.143 and statistically significant at 5 per cent level. Therefore, a one per cent increase in the exchange rate will cause a 0.143 decrease in employment elasticity in the long run. This implies that increase in the rate of exchange rate (depreciation of the domestic currency) deterred employment yield of economic growth. A probable explanation is that depreciation of the domestic currency contracts the growth of real output due to high dependence on import of inputs and

capital goods. Alexandre, Bacao, Cerejeira & Portela (2010) finds similar results; a negative relationship between exchange rate and employment elasticity for 23 OECD countries. The results are also consistent with Mouelhi and Ghazali (2014) who found that nominal exchange rate was negative and highly statistically significant to employment elasticity across all specifications in Tunisia.

The FDI variable had a statistically significant coefficient of 0.061 at one per cent level of significance. Therefore, a one per cent increase in FDI led to 0.061 per cent increase in employment elasticity. This implies that an increase in FDI enhanced employment elasticity in the long run. Foreign direct investment brings investable financial resources, provides new technologies and improves the efficiencies of existing technologies and therefore acts as a stimulant for employment growth. The results contradict Akinkugbe (2015) who found that the surge in FDI inflows has not manifested in significant formal sector job creation and reduction in unemployment levels in the long run.

The coefficient of population density variable was found to positively influence employment elasticity. The coefficient was also statistically significant at 5 per cent level with a magnitude of 0.053. Therefore, a one unit increase in population density increases employment elasticity by 0.053 per cent. This meant that an increase in population density also led to a high employment elasticity in the long run. The estimation results contradict Crivelli *et.al* (2012), who found population density to be negatively correlated with employment-output elasticities, for 167 countries.

4.4.3 Impact of Fiscal Policy Variables on Employment Elasticities in Kenya

The third objective of this study was to establish the response of employment elasticities to changes in fiscal policy variables in Kenya. To achieve this objective, a structural VAR model given in equation 3.72 was estimated so as to capture the effect of one standard shock on the fiscal policy variables on employment elasticity. The choice of the structural VAR was to use economic theory to recover the structural innovations from the residuals (Enders, 2015). A structural model predicts the effect of intervention or deliberate policy actions, or changes in the economy using theoretical restrictions to identify the shocks.

These restrictions are given from the theoretical model adopted to assess the relationship among the variables. The structural VAR was also used because variables employment elasticity, budget deficit, debt, recurrent expenditure, development expenditure and tax revenue under objective three, were integrated of different orders as shown in Table 1 of Appendix 2. Differencing data throws away information concerning the co-movements in the data such as the possibility of cointegrating relationships (Enders, 2015).

Structural VAR estimation involves expressing each variable as a function of its own present and past values, as well as a function of other variable present and the past values. After the structural VAR was estimated, several diagnostic tests were carried out to help check its appropriateness. These tests were imperative to avoid spurious estimation results. The results of these diagnostic tests are given in Table

4.6. From the diagnostic tests results presented in Table 4.6, the estimated structural VAR was stable (stationary) because all roots had modulus less than one and lied inside the unit circle with the highest root being 0.99. The study used the VAR serial Correlation LM test for serial correlation to test the null hypothesis that there is no serial correlation up to the third lag. Table 4.6 shows an LM statistic of 149.29 with a p -value of 0.0630. Since this p -value (0.0630) was greater than 0.05, the null hypothesis of no residual serial correlation in the model was accepted.

Table 4.6: Summary of VAR Diagnostic Statistics

Var Condition check	Statistic	Result
Stability condition	Roots of polynomials are within the unit cycle with highest root being	Var satisfies the Stability condition
Residual serial correlation LM test	LM test statistic 149.2948	Accept null hypothesis of no
Residual Heteroscedasticity Test	Joint Chi-Square =1280.199	Residuals are homoscedastic.
Residual Normality Test	Jarque-Bera (Joint) statistic 156.491 P value= 0.632	Residuals are multivariate
Lag Exclusion Test	Wald test for 1 lags, Chi-square = 559.2090	3 lags are important

Source: Derived from the collected data

The Breusch-Pagan-Godfrey test indicated non-existence of heteroscedasticity in the residuals as shown by a joint Chi-square value of 1,280.199 with a p -value of 0.4018. The normality test reported the multivariate extensions of the Jarque-Bera residual normality test, which compares the third and fourth moments of the residuals to those from the normal distribution. The estimated joint Jarque-Bera

statistic was 156.491 with a probability p -value of 0.632 indicating that the residuals were normally distributed.

4.4.3.1 Impulse Responses Analysis Results

The VAR results were used to generate impulse response functions and forecast error variance decomposition (FEVD) analysis. Impulse response analysis helped to trace the impact of a one standard deviation shock to the innovations on current and future values of all the endogenous variables of the system. Plotting the impulse response functions was a better way of tracing the time path of the system variables as they responded to various shocks over time.

An impulse response function traces the effect of a one standard deviation shock to one of the innovations on current and future values of the endogenous variables. A shock to the i^{th} variable directly affects the j^{th} variable and is also transmitted to all of the endogenous variables through the dynamic structure of the VAR (Enders, 2015). The plots and impulse responses that follow summarize the results of the shock evaluation indicating the responses of each variable over the 15 years horizon to one standard deviation positive shock to each variable.

4.4.3.2 The Impact of Taxation on Employment Elasticity

Figure 4.1 shows the effect of a one standard deviation shock in taxation on employment elasticity.

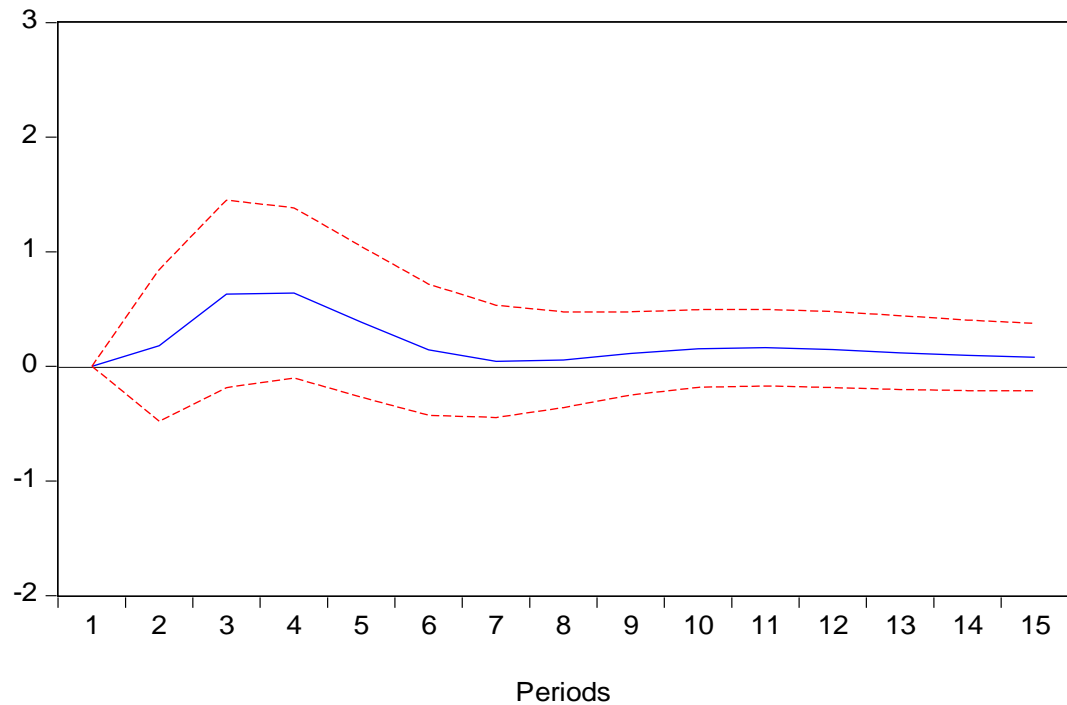


Figure 4.1: Impact of Taxation on Employment Elasticity

Source: Derived from the collected data

The response to one standard deviation shock in taxation resulted in a fluctuating time path. The impulse response revealed that employment elasticity responds positively to taxation from the first period to the remaining period as shown in Figure 4.1 but never fizzled out. Figure 4.1 shows that a contractionary fiscal policy shock in Kenya leads to an increase in employment elasticity over the study period.

The results are contrary to Murwirapachena (2010) who found that a one-period standard deviation shock on taxation marginally appreciates unemployment by about 3 per cent but the impact dies off quickly in a period of about 6 years. The

long run effect of taxation on employment elasticity could be explained by the fact that taxation is intended to raise the necessary funds for public expenditure and redistribution of income, which impacts positively on economic growth and consequently on employment growth.

The outcome is in line with the *Kenya Vision 2030* that targeted tax reforms which were to enhance tax compliance and broaden the tax base. This would as a result enhance the government's revenue capacity to finance development programme and government projects. This contribution leads to a multiplier effect due to its linkage with other sectors. Enhanced tax revenue is important for any country since it enables the country's government to cater for the welfare of her people by generating sufficient revenue to finance her expenditures.

In addition, a country that mobilizes adequate tax revenue reduces her budget deficit which translates into reduced external borrowing. Reduced external borrowing is good for economic growth since the amount of country's revenue which could be used in paying the external debt can be employed in other productive sectors of the economy. This in turn will assist the country to increase employment opportunities.

4.4.3.3 The Impact of Debt on Employment Elasticity

Figure 4.2 shows the effect of a one standard deviation shock on foreign debt on employment elasticity.

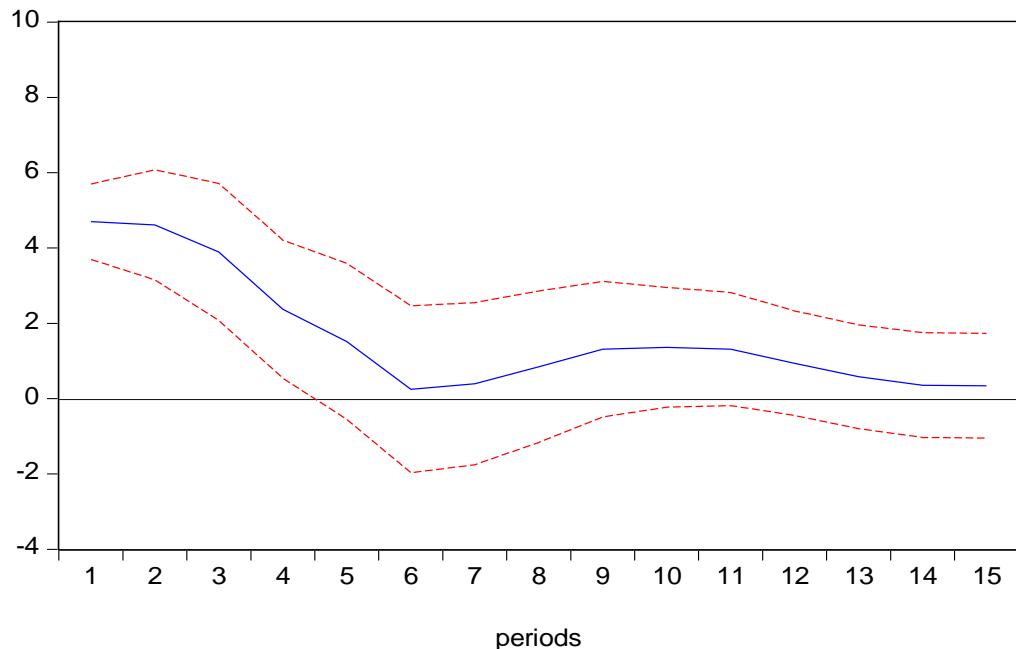


Figure 4.2: Impact of Debt on Employment Elasticity

Source: Derived from the collected data Source

The response to one standard deviation shock in debt resulted in an oscillating time path with respect to employment elasticity as shown in Figure 4.2. Figure 4.2 shows that a one standard deviation shock on debt had a pronounced positive effect on employment elasticity over the entire period of study.

Borrowing by a government enhances development in a country through growth in productive capacity and accumulation of capital. Borrowing is believed to be a means of bridging domestic savings gap in times of falling government revenues from internal sources. Borrowing is also seen as a means of assisting a country to increase their rate of investment in addition to promoting economic growth. Public debt, therefore, can act as a source of capital formation and by implication a means of generating employment opportunities. Also, borrowing for productive investment creates macroeconomic stability as well as providing capital inflow

which impacts positively on domestic savings thus creating investment demand (Burnside & Dollar, 2000).

The results could also be as a result of the infrastructural and flagship projects envisioned in the *Kenya vision 2030* such as the Lamu Port South Sudan-Ethiopia Transport project (LAPSSET), Standard Gauge Railway (SGR) and geothermal power generation which require large amount of funds beyond the government revenue collection capacity. The establishments of such projects have led to creation of many direct and indirect employment opportunities.

4.4.3.4 The Impact of Budget Deficit on Employment Elasticity

Figure 4.3 shows the effect of a one standard deviation shock of budget deficit on employment elasticity.

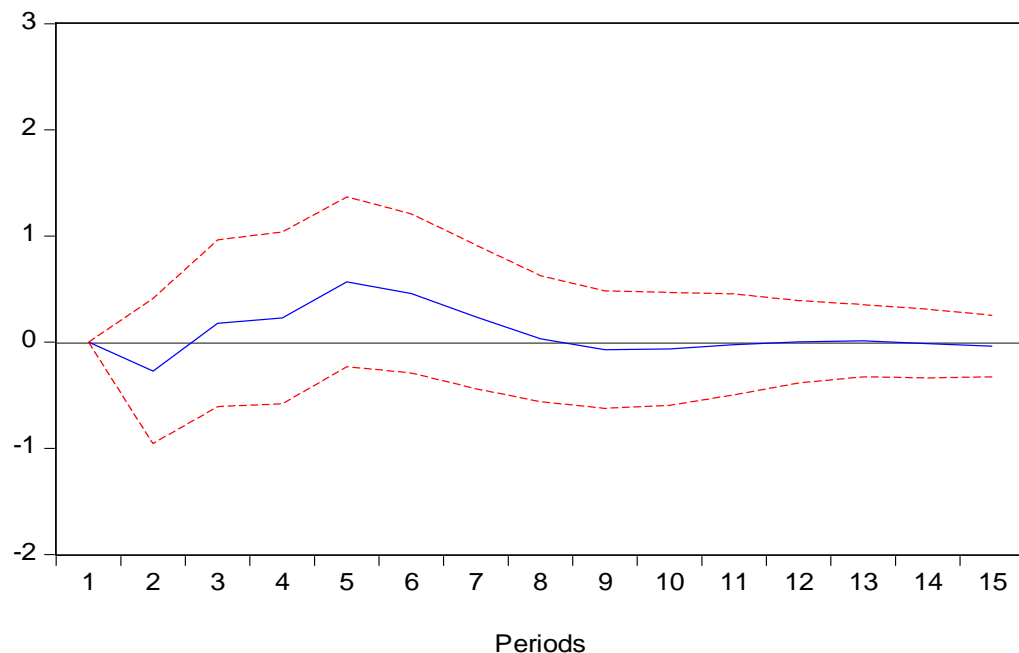


Figure 4.3: Impact of Budget Deficit on Employment Elasticity
Source: Derived from the collected data Source

The response to one standard deviation shock in budget deficit resulted in a cyclical time path. Figure 4.3 showed that a one standard deviation shock on budget deficit first had a negative impact on employment elasticity between the first and the third period. The effect again became positive between the third to ninth period before becoming negative for the remaining periods. Convergence occurred after a twelve year period. This implies that budget deficit had a mixed effects on unemployment elasticity. Though since the effect was in the positive territory for longer period compared to the time on the negative territory, the finding suggests that budget deficit promotes employment elasticity. The results are in line with the Keynesian theoretical prediction that budget deficits are important components in increasing aggregate demand and in turn stimulating the economy through the multiplier effect (Keynes, 1936). Fiscal deficit shows the extent to which government revenue is unable to finance its expenditure.

Budget deficit is a driver of public debt as deficits accumulated overtime contributes to the size of the public debt in any economy. According to Were (2001), deficit financing is an ideal tool in macro-economic management provided it is efficiently financed and productively utilized on programme that will be self-sustaining. However, excessive and prolonged deficit financing though negates the attainment of macroeconomic stability which affects the attainment of the desired fiscal policy objectives including creation of employment opportunities.

4.4.3.5 The Impact of Recurrent Expenditure on Employment Elasticity

Figure 4.4 shows the effect of a one standard deviation shock of recurrent expenditure on employment elasticity.

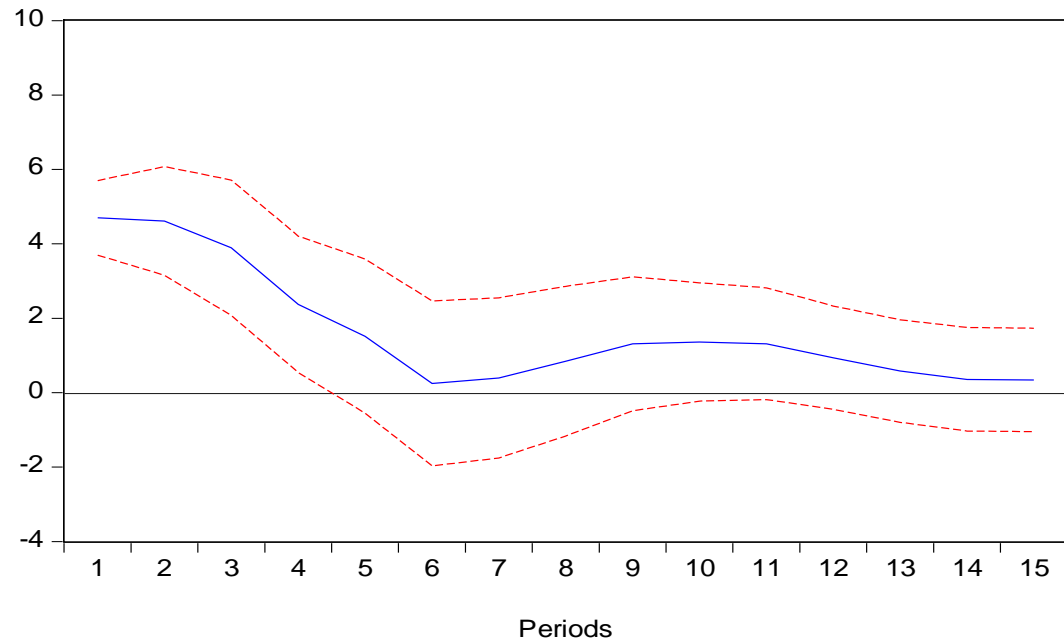


Figure 4.4: Impact of Recurrent Expenditure on Employment Elasticity
Source: Derived from the collected data Source

The response to one standard deviation shock in recurrent expenditure resulted in a cyclical positive time path, with respect to employment elasticity as shown in Figure 4.4. The results in Figure 4.4 showed that a one standard deviation shock on recurrent expenditure remained on the positive side for the entire period. The results concur with the Keynesian theory which asserts that public expenditure is an exogenous factor which can be utilized as a policy instrument to promote economic growth. From the Keynesian thought, public expenditure can contribute positively to economic growth and hence lead to an increase in employment and investment

through the multiplier effects on aggregate demand. The results are however inconsistent with Fouladi (2010), who found that increasing the government consumption expenditure causes reduction in production, employment and investment. A probable explanation could be the fact that the bulk of recurrent expenditure goes to paying wages and salaries. Under either of these conditions, higher current expenditures of the government stimulate demand for products, which in turn allows producers to increase use of their productive capacities by hiring new capital, labour and thus expand production.

4.4.3.6 The Impact of Development Expenditure on Employment Elasticity

Figure 4.5 shows the effect of a one standard deviation shock on development expenditure on employment elasticity.

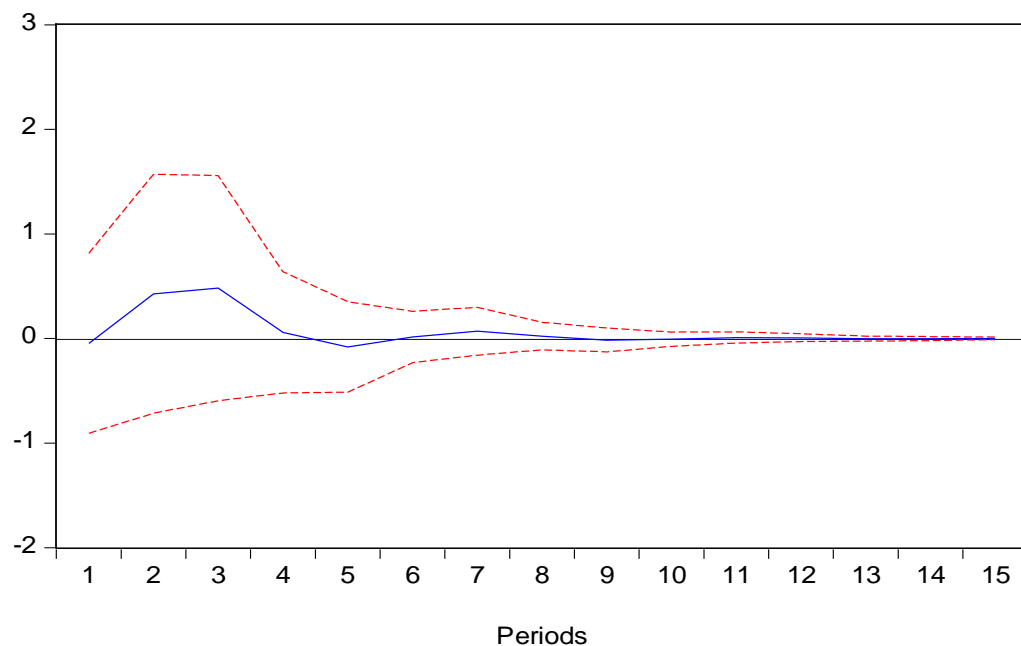


Figure 4.5: Impact of Development Expenditure on Employment Elasticity
Source: Derived from the collected data Source

The response to one standard deviation innovation in development expenditure resulted in a cyclical time path. The impulse response revealed that employment elasticity first had a positive impact on employment elasticity from the first period to the fifth period. The effect again became negative from the fifth to seventh the period before becoming positive for the remaining period. Convergence occurred after a 10 year period. The results are consistent with Murwirapachena (2010), who found that a one period standard deviation shock to government spending depreciates unemployment by about 3 per cent, and gradually levels off in about 6 years suggesting that an expansionary fiscal policy depreciates unemployment. However, Fouladi (2010), noted that government investment expenditure had different effects on economy which depends on their nature and the sector spent on. Essentially, there is no reason why government expenditure on development should not complement employment elasticity. What is required is reallocation of funds towards activities that supports employment. Development expenditure on areas such as roads, railways, ports, communication, water and electricity could increase the productivity of inputs in the economy, thus promoting their expansion and creating employment opportunities. High government expenditure on transport, communication and energy could create an enabling environment for businesses to thrive through reduced cost of production. This will effectively result to increase in employment opportunities in the long-run.

4.4.4 Forecast Error Variance Decomposition Analysis

Variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR. Thus, the variance decomposition provides information about the relative importance of each random innovation in affecting the variables in the VAR. Enders(2015), observed that own series shocks explain most of the forecast error variance of the series in a VAR. The technique determined how much of the forecast error variance in private employment elasticity was explained by innovations in each of the explanatory variables over a series of a time horizon (Enders, 2015). The same factorization technique and information used in estimating impulse responses was applied in the variance decompositions.

Table 4.7 shows the decomposition of the variation in employment elasticity into its (significant) component shocks. The results in the Table show the variations in employment elasticity in some of the annual periods up to the 15th annual period. The results of Variance Decomposition analysis of employment elasticity show that all the variations in employment elasticity were due to its own shocks at 100 per cent in the first period. This implies that all the other variables did not contribute at all to the variations in employment elasticity in the first period. The variations of own shocks in employment elasticity reduced to 87.41 per cent in the third period. In the sixth period the variations reduced to 72.62 per cent and continued to reduce as the forecasting horizon increased.

Table 4.7: Variance Decomposition of Employment Elasticity

Variable	1 st Period	3 rd Period	6 th Period	9 th Period	12 th Period	15 th Period
Employment	100	87.41	72.62	62.72	61.55	61.22
Debt	0.00	0.97	5.58	5.37	5.46	5.71
Budget Deficit	0.00	8.59	10.08	9.10	9.06	9.03
Recurrent	0.00	0.41	7.22	14.61	14.79	14.87
Development	0.00	0.11	0.29	0.45	0.56	0.44
Taxation	0.00	1.11	3.66	5.91	6.44	6.46

Source: Derived from collected data

The results in Table 4.7 reveal that the effect of other variables in the system increased with the forecast period. This implies that employment elasticity had feedback effects with the variables in the system and the effects were multidirectional. The results further reveal that concerning variations in employment elasticity, contributions by recurrent expenditure were the largest followed by budget deficit and public debt. This emphasized the fact that a bigger proportion of the recurrent expenditure in Kenya goes to paying wages and salaries. The results are consistent with Kon (2007), who found out that the elasticity of labour supply with respect to wage is an important determinant of employment effect of economic growth.

Results in Table 4.7 also revealed that public debt had a substantial impact on the variations in employment elasticity. This could have been because borrowing primarily finances infrastructure development in the country and also helps the government diversify its investor base. Also, in line with *Kenya Vision 2030*, the

country was able to issue the International Sovereign Bond that was successfully issued in 2013/2014 that was meant to diversify the country's funding sources. This enabled the country to tap into the international capital markets to fund their business expansion at a reasonable cost. Access to such external funds for the public and private sector, implies more resources being available in the domestic financial system for lending to local investors. The additional resources in the country's financial system will lead to a decline in domestic interest rates. Decline in domestic interest rates is expected to boost investments, economic growth and provide more employment opportunities (Republic of Kenya, 2015).

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Introduction

This chapter presents the summary of the study, conclusions, policy implications and areas for further research.

5.2 Summary

The main objective of this study was to determine the effect of fiscal policy on employment elasticities in Kenya. Creation of sustainable employment opportunities has remained a central policy priority of the Kenya government. Since attaining political independence in 1963, the Kenya government has implemented various fiscal policies that focus on employment creation. These policies have been documented in various sessional papers and development plans. In the *Kenya Vision 2030*, employment creation is anchored on the implementation of fiscal policies in priority sectors. The government's aspiration has been that long-term and sustained high rates of economic growth would facilitate generation of employment opportunities at rates higher than the proportionate increase in the labour force. However, the rate of growth in employment has not been consistent with the rate of economic growth in the country. This study was, therefore, important since it offers an understanding of the effect of fiscal policy on employment elasticities in Kenya

This study differed from previous studies in many ways. Firstly, it focused on sectoral elasticities unlike many other studies which considered the aggregate employment elasticity. Secondly, unlike previous studies that focused only on determining employment elasticities, this study identified the determinants of employment elasticities in Kenya. Finally, this study determined the effects of fiscal policy variables on employment elasticity which hitherto had not been explored.

The first objective of this study was to estimate the magnitude of employment elasticities in the priority sectors in Kenya. This was empirically determined by undertaking a log linear regression of sectoral GDP and employment per sector. The study established that all the priority sectors were employment inelastic. This is because the employment elasticity coefficients for the priority sectors were less than unitary ranging between 0.115 and 0.412. This implied that a unit increase in sectoral GDP resulted in less than proportionate increase in employment within each sector.

The study further established that information and communication technology sector had an employment elasticity coefficient of 0.412, which was the highest employment yield of economic growth among the priority sectors. Agriculture sector had an employment elasticity coefficient of 0.115 which meant that a one per cent increase in GDP for agriculture sector led to 0.115 per cent increase in employment within the sector. The coefficient for the employment elasticity variable for tourism sector was 0.187 while that of manufacturing sector was 0.198. Wholesale and retail sector recorded an employment elasticity coefficient of 0.232

over the study period while the financial sector recorded an employment elasticity 0.254 over the same period.

To determine the drivers of employment elasticity in Kenya, an ARDL model was estimated. The ARDL model was used because variables such as average wage, exchange rate, inflation, labour force participation rate, population density, trade openness and FDI were either integrated of order zero or integrated of order one. When variables are integrated of different orders, the ARDL model of estimation has the ability to estimate the long and short-run parameters of the model irrespective of the problems posed by non-stationary time series data.

Inflation rate was found to be negatively related to employment elasticity in the short run. According to the study, a one per cent increase in inflation rate would reduce employment elasticity by 0.11 per cent. The findings are consistent with economic theory which envisages a negative relationship between inflation and employment growth. Annual average wage was also found to be negatively related to employment elasticity in the short run. A one per cent increase in annual average wage would reduce employment elasticity by 0.0012 per cent. Exchange rate had a negative and statistically significant relationship with employment elasticity in the long run. Thus, the depreciation of the domestic currency contracts the growth of real output due to high dependence on import of inputs and capital goods.

Population density was found to be positively related to employment elasticity in the short run. A one per cent increase in population density would increase employment elasticity by 0.031 per cent. Labour force participation rate was also

found to have a positive and statistically significant relationship with employment elasticity with a magnitude of 0.045. The coefficients of the first and second lags of labour force participation rate variable were also positive and statistically significant at 5 and 1 per cent levels, respectively. This implies that higher labour supply leads to lower wages and ultimately leads to an increase in demand for labour input. Foreign direct investment also had a positive and statistically significant relationship with employment elasticity in the long run. A one per cent increase in FDI led to 0.061 per cent increase in employment elasticity. Thus, FDI enhanced investments that resulted in the creation of employment opportunities.

The third objective of the study was to determine the response of employment elasticities to changes in fiscal policy variables in Kenya. To achieve this objective, the study used the structural vector auto-regression model, which yielded impulse responses and variance decomposition analysis of recurrent expenditure, development expenditure, budget deficit, debt and total tax revenue. The structural VAR was preferred because variables were integrated of different orders and differencing throws away information concerning the co-movements in the data. The impulse response functions, and variance decomposition analysis revealed the results of the responses of employment elasticity over the horizon of fifteen annual periods to one standard deviation positive shock to each of the fiscal policy variables. The results showed that the effect of recurrent expenditure, development expenditure, total tax and debt all had positive effects on employment elasticity. The results further revealed that budget deficit had mixed outcomes on employment elasticity.

5.3 Conclusions

The first objective of the study sought to estimate the magnitude of employment elasticities in priority sectors in Kenya. It can, therefore, be concluded that all the priority sectors were employment inelastic. This suggests that although output within the priority sectors continued to grow, the gain in output growth was based on productivity growth rather than employment growth. Also, from the magnitude of the sectoral employment elasticities, it can be concluded that service sectors like ICT and financial sector had higher employment yield of output growth compared to other sectors.

The second objective of the study sought to determine the drivers of employment elasticity in Kenya. Empirical findings indicate that the first lag of employment elasticity, average wage, inflation rate, labour force participation rate, first and second lags of labour force participation rate, population density, first and second lags of FDI were the short run drivers of employment elasticity. Empirical findings also indicate that exchange rate, FDI and population density are the long run drivers of employment elasticity in Kenya.

The third objective of the study was to determine the response of employment elasticities to changes in fiscal policy variables in Kenya. It may be concluded that total tax revenue, recurrent expenditure, development expenditure and debt impact positively on employment elasticity. However, budget deficit has mixed effects on employment elasticity.

5.4 Policy Implications

Empirical findings for the first objective on the estimation of the magnitude of employment elasticities within the priority sectors indicated that all the priority sectors which included agriculture, manufacturing, wholesale and retail trade, financial sector, ICT, and tourism had employment elasticities coefficients that ranged from 0.115 to 0.412. This implied that all the priority sectors were employment inelastic and each sector had a different response to fiscal policies. The study recommends that policies pursued by the government to boost employment should be sector specific. The Kenyan government can achieve this by ensuring that Sector Plans and MTPs designed for realization of national growth targets on employment under the *Kenya Vision 2030*, or any other economic agenda, accommodates programme that are employment-intensive. In addition, the Kenyan government can adopt employment intensive technologies for each of the priority sectors.

The government should prioritize growth in both the ICT and financial sector. This is linked to the finding that ICT and financial sectors had the highest employment elasticity coefficients of 0.412 and 0.254, respectively amongst the priority sectors. This implied that employment in both ICT and financial sector which are service based, was more responsive to GDP than the other priority sectors. To achieve this, infrastructural development within the ICT should be a central focus. This could be supported by ensuring access to universal ICT and promotion of ICT based

industries. This can be spearheaded by the Ministry of Information Communication and Technology. For the financial sector, the government through Central Bank could enhance financial deepening. This can be realized by strengthening the financial sector to ensure that entrepreneurs and investors are supported with affordable credit and other financial services.

The study finding pointed to a negative association between inflation rate and employment elasticity. This implies that a high inflation rate hinders creation of employment opportunities. Policy measures to control inflation should be tightened. This could be realized by devising strategies to increase the tax base and improve the tax compliance in the country. This will ease the burden of rising costs as a result of high taxation on petroleum products which is a major determinant of inflation. Taxation on petroleum has huge inflationary ripple effects on the economy. This measure can be spearheaded by the National Treasury. To control inflationary pressure arising from fluctuation in food prices, it is recommended that the strategic food reserves should be expanded to include other food products and invest in the improvement of its facilities and infrastructure to enhance post-harvest management. In addition, new and innovative strategies should be adopted to move the country from reliance on rain-fed agriculture. This can be spearheaded by the National Cereals and Produce Board (NCPB) and National Irrigation Board (NIB), respectively.

The study found that the coefficients of the first lag and the second lag of foreign direct investment were positive and statistically significant. This implied that the

impact of an increase in foreign direct investment in the current period affected employment after one period and also two periods later. The coefficient of foreign direct investment was also positively and statistically significant in determining employment elasticity in the long run. This infers that foreign direct investment is a stimulant for employment growth both in short run and in the long run. This study recommends that efforts to attract more foreign direct investment should be undertaken. Government through relevant agencies should increase the ease of doing business in the country. This could be achieved by enhancing infrastructural development in the country which is a key driver of FDI. Another measure to enhance FDI in the country could be through enhancement of foreign direct investments incentives. These measures can be directed by the National Treasury.

The study finding pointed to a negative but statistically significant relationship between exchange rate and employment elasticity in the long run. However, the relationship between exchange rate and employment elasticity was statistically insignificant in the short run. The implication is that a depreciation of the domestic currency hinders employment elasticity in the long run. The study recommend that a stable exchange rate should be maintained. This could be achieved by growing and diversification of exports. In addition, tourism which is a major source of foreign currency can be promoted by investing in product diversification in the tourism sector.

The empirical results showed that average wage had a negative and statistically significant relationship with employment elasticity only in the short run. This infers

that higher average wages reduces employment elasticity in the short run. The government should harmonize the salary scale framework to regulate the wages in the country. This could be realized through salary adjustments based on a periodical and systematic evaluation of wage parameters in the public sector and taking cognizance of the prevailing economic dynamics. These measures could be spearheaded by the government.

Regarding government expenditure, the government ought to pursue prudent expansionary policies that will boost expenditure. This is informed by the finding which indicated that both development and recurrent expenditure enhanced employment elasticity. This could be realized by eliminating unproductive expenditures and focus on projects and programme that are more productive capable of generating employment opportunities. Such productive government expenditure may include investments in infrastructural development that are capable of exerting positive externalities that raise employment elasticities. This could be headed by the National Treasury.

The study finding pointed to a positive impact of debt on employment elasticity. This suggests that debt promotes employment elasticity. The study recommends that the government streamlines the strategies of financing the fiscal deficit. This could be achieved by ensuring all funds from borrowing are utilized well to boost the economy and enhance investments leading to creation of employment opportunities. In addition the government should ensure that the debt is stable. A

stable debt could improve investor confidence leading to creation of more employment opportunities.

5.5 Contribution to Knowledge

The study contributes to the body of knowledge on several accounts. First, unlike previous studies that have been limited to estimating aggregate employment elasticities, this study estimated sectoral elasticities in the key priority sectors in Kenya. The specific sectoral employment elasticities are important to the government since they provide the basis for sector specific employment creation interventions. Further, the sectoral employment elasticities can be applied by the government to identify the extent to which structural economic changes are taking place in the priority sectors.

Second, this study breaks from the long tradition of examining the relationship between the unemployment rate and output growth or Okun's law by focusing on labour demand that involves measuring the sensitivity of employment to the variations in economic growth. Contrary to Okun's law, which states that when unemployment falls by 1 per cent, GDP rises by 3 per cent, this study establishes that the response of employment as a result of an increase in GDP varies across sectors. This revelation is important to the government in distinguishing sectors with low job creation capacity from sectors with high job content.

This study also provided empirical evidence on the determinants of employment elasticities in Kenya. The study findings related to determinants of employment elasticities themselves are highly relevant in policy focus aimed at promoting employment creation and productivity in the economy.

5.6 Areas for Further Research

First, the study suggests that a research which will involve estimating employment elasticities for all economic sectors within the economy be conducted. This will provide an opportunity to get firsthand information as to how each and every sector responds to output growth.

Second, the study suggests that a research be conducted on sectoral linkages. This will help to understand the impact of a sector's contribution to the other sectors and the effects of sectors interdependence on employment elasticity. This is because of the mutual interdependence and symbiotic relationship within the priority sectors.

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APPENDICES
Appendix 1: Data Used in the Study

Table A1: Data on Sectoral Employment

Year	Sectoral Employment (Numbers)					
	Agriculture	Manufacturing	Wholesale	Financial	ICT	Tourism
1970	204525	82256	32471	10002	2573	7705
1971	211130	92803	35942	10732	2481	8682
1972	225068	95273	34838	9154	2656	8581
1973	265356	94453	36205	20270	2732	10370
1974	261148	101332	45108	21896	3091	11913
1975	240609	100731	42559	24090	3195	11131
1976	243039	108776	46316	25444	3347	13836
1977	260269	117949	48878	29662	3850	13716
1978	243031	130056	48392	32012	4218	14135
1979	254515	138409	53464	35681	4656	15259
1980	231361	141280	54262	39738	4985	16242
1981	235531	146338	54311	39522	5078	18291
1982	223867	146780	56419	43654	6103	18463
1983	231068	148758	60475	45608	6883	19819
1984	235649	153145	64226	50154	7216	20553
1985	240879	156763	67908	53363	8309	21808
1986	248455	164800	72286	55980	10857	22177
1987	256978	169762	75312	57500	11205	24105
1988	271312	170258	73023	60585	11475	26011
1989	261801	182800	83713	63699	20639	26584
1990	269724	187683	84998	65249	22586	28978
1991	272015	188873	87060	66328	22915	29683
1992	273889	190296	88112	70612	24475	30412
1993	274268	193537	89060	72635	23377	31971
1994	281008	203528	91936	74966	25103	34703
1995	294045	210775	98129	78044	25089	36758
1996	302940	216411	104328	81051	29330	38849
1997	305518	220481	107380	83167	28752	40844
1998	308815	216889	110990	84003	28671	39737
1999	312456	221896	114124	84528	28062	39505
2000	312459	220481	116482	84988	30423	39025
2001	312571	218587	118090	83766	32514	38417
2002	313571	231748	120193	83267	34114	37332
2003	316016	243743	125253	83286	36664	37496

Table A1: Continued

Year	Agriculture	Manufacturing	Wholesale	Financial	ICT	Tourism
2004	320630	244518	131681	85169	44202	38308
2005	327161	248416	135826	88932	55246	39582
2006	334588	254851	144196	92325	65829	41696
2007	339852	261345	151918	94968	68456	43909
2008	338363	264835	144254	101270	64130	60633
2009	337071	265438	154033	102659	69184	63963
2010	341369	267909	162377	108433	75320	67278
2011	341422	276885	170681	112745	78232	70809
2012	337691	271026	176962	117045	83901	73422
2013	342504	279396	212152	134300	92437	73463
2014	333281	287456	220256	136069	99163	73165
2015	336979	295419	232265	145300	105633	76105
2016	336746	300837	239864	150423	110604	77363

Table A2: Data on Sectoral Contribution to GDP

Year	Sectoral Contribution To GDP(Millions)					
	Agriculture	Manufacturing	Wholesale	Financial	ICT	Tourism
1970	316.84	631.638	335.396	147.344	36.304	47.322
1971	354.418	691.234	366.73	154.72	24.246	64.276
1972	427.31	753.992	360.478	180.472	30.472	58.614
1973	576.95	773.508	380.594	328.94	31.522	78.202
1974	609.664	885.18	485.286	382.4	33.054	90.348
1975	678.694	1003.82	522.362	469.172	44.342	100.408
1976	912.532	1153.88	602.608	550.408	56.012	134.044
1977	1021.01	1384.61	687.894	689.66	67.258	141.256
1978	1099.31	603.908	768.666	765.952	86.324	151.064
1979	1256.89	1801.64	947.27	955.564	110.272	199.258
1980	1206.19	2123.09	1175.63	1238.98	143.808	256.688
1981	1365.26	2444.29	1253.77	1474.54	179.318	380.354
1982	1349.24	2722.51	1384.09	1611.29	210.158	357.74
1983	1494.96	2987.98	1599.86	1772.48	244.228	398.728
1984	1654.22	3374.36	1829.54	2166.62	229.12	499.698
1985	1837.84	3764.71	2032.49	2575.65	252.894	593.832
1986	2148.21	4109.56	2305.95	2975.62	383.036	681.866
1987	2449.49	4672.89	2621.84	3262.64	449.636	802.936
1988	3040.69	5044.72	2976.58	3938.17	497.54	1039.74
1989	3113.73	6135.73	3761.07	4541.15	960.192	1179.18
1990	3515.16	6902.2	4245.71	5288.46	1055.06	1393.57
1991	3999.79	7534.29	4754.15	5882.15	1189.6	1486.9
1992	4698.52	8423.36	5425.45	6931.69	1288.97	1665.47
1993	5527.84	9735.82	6186.9	7943.92	1488.59	2183.35
1994	7006.62	11658.8	7414.06	9192.76	2001.22	2969.24
1995	9071.62	15307.2	9861.63	117775	2501.22	3970.49
1996	11598.9	19159.9	12742.5	14773	3710.91	5280.62
1997	14121	23640.2	15706.1	18401.6	4363.09	6825.84
1998	17176.2	29343.7	19322.9	22388	5493.26	8169.64
1999	19686.1	34109.7	24518	25920.2	5843	9503.8
2000	22492	38004.8	28589.9	29811.8	7567.3	11179
2001	25919.6	42499.1	33993.7	34765.4	10154.2	13384.7
2002	29374	49151.7	39859.2	40231.4	12993.2	15484.9
2003	33323.4	42805.9	45531.9	43994.1	15951.8	18401.2
2004	39134.4	53150.2	50999.9	50796.2	17284.3	20888.8
2005	41932	41385.7	65935.9	61902.5	34463.1	27181.6

Table A2:Continued

Year	Agriculture	Manufacturing	Wholesale	Financial	ICT	Tourism
2006	46517.8	46518.5	78213.9	73410.5	45307.3	32946.7
2007	50237.7	50910.7	88157.2	85585.1	58434.1	38022.9
2008	56135.3	69291.9	65373.2	76913.4	42828.4	22471.9
2009	58331.7	72755.3	68829.4	82912.5	46587.2	22366.4
2010	60727.9	74974.3	73046.5	90010.6	49953.2	23070.6
2011	63783.5	79759.8	80172.4	97576.3	51912.4	23931.5
2012	68630.2	84317.8	85090.1	105270	55816.3	24658.1
2013	78572.8	98305.1	105394	146713	66951.6	26362.7
2014	80984.6	109900	115776	157249	73844.2	27354.7
2015	89554.6	124477	133724	179747	84426	30566.6
2016	98282.7	137551	148946	197159	96473.4	32233.9

Table A3: Data on Fiscal Policy Variables

Year	Real GDP	Debt To GDP	Exchange Rate	Inflation Rate	Tax Revenue
1970	527290	30.7	7.1	2.19	2095.6
1971	649235	29.6	7.1	3.78	2156.2
1972	728281	26.9	7.1	5.83	2342.8
1973	803959	28.6	7.0	9.28	3210.4
1974	803079	25.8	7.1	17.81	3969.2
1975	709492	26.7	7.3	19.12	4571
1976	684688	28	8.4	11.45	5318
1977	901920	23.8	8.3	14.82	7995.4
1978	1109375	25.6	7.7	16.93	8394
1979	1046962	35.6	7.5	7.98	10302.4
1980	1107378	32.7	7.4	13.86	12170
1981	1153078	43.5	9.0	11.60	13523
1982	1156013	54.4	10.9	20.67	14065.4
1983	1161584	56.3	13.3	11.40	16247
1984	1164212	50.9	14.4	10.28	17719.2
1985	1225587	54.6	16.4	13.01	21271.6
1986	1376692	54.7	16.2	2.53	24814.4
1987	1458438	58.8	16.5	8.64	29066.6
1988	1577145	45.1	17.7	12.26	32889.4
1989	1639577	44.52	20.6	13.79	36612.6
1990	1681503	50.2	22.9	17.78	42057.6
1991	1690635	57.31	27.5	20.08	49529
1992	1646235	54.81	32.2	27.33	61414
1993	1636602	82.09	58.0	45.98	94084.2
1994	1750795	75.92	56.1	28.81	108111
1995	1827953	69.36	51.4	1.55	122745
1996	1457115	60.79	57.1	8.86	126999
1997	1541785	50.55	58.7	11.36	147893
1998	1604317	54.43	60.4	6.72	155529
1999	1653902	53.67	70.3	5.74	156966
2000	1672213	52.23	76.2	9.98	163079
2001	1020111	56.22	78.6	5.74	162464
2002	1025583	61.84	78.7	1.96	196975
2003	1055658	60.13	75.9	9.82	219151
2004	1109338	53.8	79.2	11.62	264763
2005	1172784	48.34	75.6	10.31	294450

Table A3:Continued

Year	Real GDP	Debt To GDP	Exchange Rate	Inflation Rate	Tax Revenue
2006	1249470	43.98	72.1	14.45	346563
2007	1336849	38.37	67.3	9.76	408445
2008	1357262	41.47	69.2	26.24	459368
2009	2863689	41.09	77.4	9.23	523633
2010	3104303	44.4	79.2	3.96	626669
2011	3294026.0	43.05	88.8	14.02	695888
2012	3444339	41.69	84.5	9.38	763828
2013	3646821	44.17	86.1	5.72	911804
2014	3842186	52.62	87.9	6.88	1021597
2015	4061901	56.2	98.2	6.58	1136564
2016	4300302	53.8	101.5	6.30	1276960
Year	Labour Force Participation Rate	Recurrent Expenditure	Development Expenditure	Budget Deficit	Elasticity
1970	76.08	2266.34	594.66	-648.9	0.35
1971	76.73	2573.4	795.3	-1769.7	0.53
1972	77.29	3791.56	895.5	-1036.4	0.54
1973	77.743	3374.52	965.6	-1790.3	-0.70
1974	78.045	4145.62	1237.76	-1499.3	0.08
1975	78.18	4935.4	1485.08	-1938.6	-1.79
1976	78.78	5701.58	1720.68	-1573.8	0.26
1977	79.07	8002.22	2302.84	-2183.5	0.04
1978	79.16	9502.08	2930.94	-3473.6	-0.80
1979	79.11	10927	3438.32	-3023.5	0.51
1980	79.10	13702	4104	-4819.7	0.37
1981	79.35	16516	4370	-6788	6.57
1982	79.48	19350	3720	-6838	7.68
1983	79.45	19798	4532	-6512	9.46
1984	79.18	21826.4	4355.4	-5118.6	0.86
1985	78.65	25016.4	3540	-4284.4	0.33
1986	78.40	30344.2	6491.6	-7323.6	0.52
1987	77.80	34620.4	5638	-5287.8	0.39
1988	76.07	39344.8	8378.8	-6854	0.56
1989	75.72	43092	11904.2	-7910	0.82
1990	73.83	54459.2	11097.2	-14246	2.96
1991	73.63	56290.8	9075.6	-4129.2	-0.39
1992	73.39	77683.4	8474.2	-9353.6	-1.18
1993	73.11	118281	11333.4	-18143	0.24

TableA3: Continued

Year	Labour Force Participation Rate	Recurrent Expenditure	Development Expenditure	Budget Deficit	Elasticity
1994	72.83	117777	14303.4	3287.2	0.57
1995	72.56	134953	17930	-3963.6	-0.14
1996	72.3	142707	15243.8	-7867	0.38
1997	72.12	138535	15647.8	-8979.6	0.30
1998	71.96	166692	13558.9	4795	0.50
1999	71.8	164996	12307.4	11495	0.37
2000	70.78	153594	18100.5	313.57	0.03
2001	69.68	154756	19417.7	-22277	0.07
2002	68.52	176530	33067.9	-20975	1.52
2003	67.32	195634	26065.1	-2443.5	1.11
2004	66.09	339689	40.140.95	-79728	1.11
2005	64.84	337684	54641.3	-57592	1.00
2006	65.02	402248	106597	-123754	0.87
2007	65.28	501719	162896	-196371	2.46
2008	65.6	517385	155353	118144	0.01
2009	65.84	603832	185529	-258310	0.16
2010	65.93	708807	244159	-251306	0.23
2011	65.99	732794	291870	-215812	0.30
2012	65.96	941192	300204	-280787	0.39
2013	65.84	1021923	511070	-35487	0.28
2014	65.71	1381044	572465	-379131	0.30
2015	65.59	1564286	483066	-476924	0.19
2016	65.44	1657215	625780	-467655	0.29

Appendix 2: Unit Root Test Results

Table A4: Clemente-Montañés-Reyes Unit Root Test with Double Mean Shift (At Levels)

Variable	Additive Outliers		Innovational Outliers	
	t-statistic	Optimal break points	t-statistic	Optimal break points
GDP growth rate	-5.166	1977, 2000	-5.941 *	1990, 2001
Inflation	-3.594	1991, 1996	-6.771*	1991,1993
Exchange rate	-2.650	1994, 2012	-4.010	1991, 2007
Population density	-2.562	1990, 2005	-0.043	1980, 1997
Labour force Participation rate	-2.479	2000, 2004	-0.916	2004, 2010
Debt	-4.474	1978, 1991	-5.024	1979, 1992
Foreign direct investment	-5.164	1980, 2008	-6.207*	1979, 2009
Development Expenditure	-1.246	2006, 2010	-5.973*	2005, 2012
Recurrent expenditure	-0.700	2004, 2011	-0.332	2009, 2012
Total tax revenue	-1.001	2003, 2010	-0.033	2006, 2012
Budget deficit	-7.068*	2008,2011	-2.459	2002, 2012
Wage rate	-4.715	1999, 2007	-5.557*	1999, 2006
Trade openness	-4.231	1978, 1993	-4.555	1980, 1994
Employment elasticity	-	1988,2002	-4.313	1989, 1998
Employment in Agriculture	-4.062	1989, 2000	-4.061	1985,1993
Employment in manufacturing	-2.781	1986, 2004	-4.452	1974, 2000
Employment in trade	-2.547	1990, 2008	-2.232	1987, 2008
Employment in ICT	-2.690	1991, 2007	-2.225	1987, 2002
Employment in Financial	-2.411	1988, 2013	-3.698	1982,2010
Employment in tourism	-2.913	1989, 2008	-2.580	1985, 2004
GDP in Agriculture	-1.349	2005, 2011	-9.664*	2003, 2013
GDP in Manufacturing sector	-1.925	1999, 2007	-5.042	1997, 2008
GDP in Financial sector	-2.588	1987, 2011	-2.248	1984, 2008
GDP in Information &	-2.495	1982,1989	-3.103	1976, 1983
GDP in Tourism	-3.225	1996, 2000	-	1997, 2011
GDP in wholesale and retail	-1.925	1999, 2007	-5.042	1997, 2008

*Source: Derived from the collected data. Note * denotes rejection of the hypothesis at 5% significant level. 5 percent critical value for two breaks: -5.490*

Table A5: Clemente-Montañés-Reyes Unit Root Test with Double Mean Shift (1st Difference)

Variable	Additive Outliers		Innovational Outliers	
	t-statistic	Optimal break points	t-statistic	Optimal break points
Exchange rate	-5.588*	1990, 1998	-5.312	1979, 2002
Population density	-6.248*	2001, 2004	-4.763	1998, 1999
Labour force Participation rate	-4.733	1989, 2000	-5.910*	1997, 2003
Debt	-5.901	1991, 1996	-5.673*	1979, 1995
Recurrent expenditure	-2.246	1999, 2005	-6.461*	2002, 2008
Total tax revenue	-5.769*	1996, 2012	-3.461	2000, 2009
Trade openness	-5.543*	1981, 1998	-4.547	1980, 1999
Employment in Agriculture	-6.102*	1985, 2000	-5.201	1987,1992
Employment in manufacturing	-5.845*	1984, 2002	-5.776	1978, 2000
Employment in trade	-3.645	1986, 2008	-6.890*	1984, 2004
Employment in ICT	-6.234*	1991, 2010	-4.409	1989, 1999
Employment in Financial	-5.687*	1992, 2004	-5.223	1982,2006
Employment in tourism	-4.551	1984, 2005	-5.580*	1985, 2002
GDP in Manufacturing sector	-3.645	1999, 2000	-5.546*	1994, 2000
GDP in Financial sector	-6.265*	1990, 2004	-3.641	1987, 2058
GDP in Information &	-4.237	1979,2001	-5.863*	1978, 1987
GDP in wholesale and retail	-3.927	1999, 2005	-5.641*	192, 2008

*Source: Derived from the collected data. Note * denotes rejection of the hypothesis at 5% significant level. 5 percent critical value for two breaks: -5.490*

Appendix 3: Diagnostics and ARDL Test Results

Table A6: Serial correlation LM test

F-statistic	0.37923	Prob. F(2,46)	0.512665
Obs*R-squared	1.054290	Prob. Chi-Square(2)	0.54323

Source: Constructed from study data

Table A7: Breusch-Pagan-Godfrey test

F-statistic	1.132551	Prob. F(4,47)	0.4515
Obs*R-squared	4.396148	Prob. Chi-Square(4)	0.4332
Scaled explained SS	4.443615	Prob. Chi-Square(4)	0.2266

Source: Constructed from study data

Table A8: ARDL Short Run Form

ARDL Cointegrating And Long Run Form
 Dependent Variable: EMPELASTICITY
 Selected Model: ARDL(1, 2, 2, 2, 0, 2,0,0)

Sample: 1970 2015
 Included observations: 43

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EMPELASTICITY(-1))	0.521200	0.149140	3.494695	0.0017
D(AVERAGEWAGE)	-0.001243	0.000003	-2.55348	0.0166
D(AVERAGEWAGE(-1))	-0.004276	0.000004	-1.081493	0.2890
D(AVERAGEWAGE(-2))	0.001528	0.000004	0.277019	0.7839
D(EXCHANGERATE)	-0.049085	0.020109	-0.440872	0.2215
D(EXCHANGERATE(-1))	0.016436	0.020991	0.783014	0.4404
D(EXCHANGERATE(-2))	0.027306	0.017704	1.542330	0.1346
D(FDI)	-0.718165	0.458242	-1.567219	0.1681
D(FDI(-1))	1.179770	0.477976	2.468262	0.0486
D(FDI(-2))	0.896711	0.403559	2.222010	0.0680
D(INFLATION)	-0.110033	0.040248	-2.733859	0.0094
D(LABOURFORCE)	0.045661	0.017419	2.622116	0.0156
D(LABOURFORCE(1))	0.080886	0.039919	3.026210	0.0192
D(LABOURFORCE(2))	0.293105	0.074834	3.916707	0.0192
D(TRADEOPEN)	0.000975	0.001435	0.679254	0.0007
D(POPENSITY)	0.017609	0.017906	2.042731	0.0082
CointEq(-1)	-1.921665	0.645920	-3.784790	0.0091

Table A9: Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AVERAGEWAGE	-0.000002	0.000001	-1.389820	0.1759
EXCHANGERATE	-0.143605	0.059905	-2.397212	0.0353
FDI	0.061486	0.014621	4.205235	0.0003
INFLATION	-0.005741	0.007826	-0.733607	0.4695
LABOURFORCE	0.009164	0.009482	0.966389	0.3424
POPDENSITY	0.053665	0.020602	2.604860	0.0404
TRADEOPEN	-0.000507	0.007460	-0.068022	0.9463
C	-24.207072	5.923060	-4.086920	0.0004

Appendix 4: Clemente Montanes Reyes Unit Root Test Figures

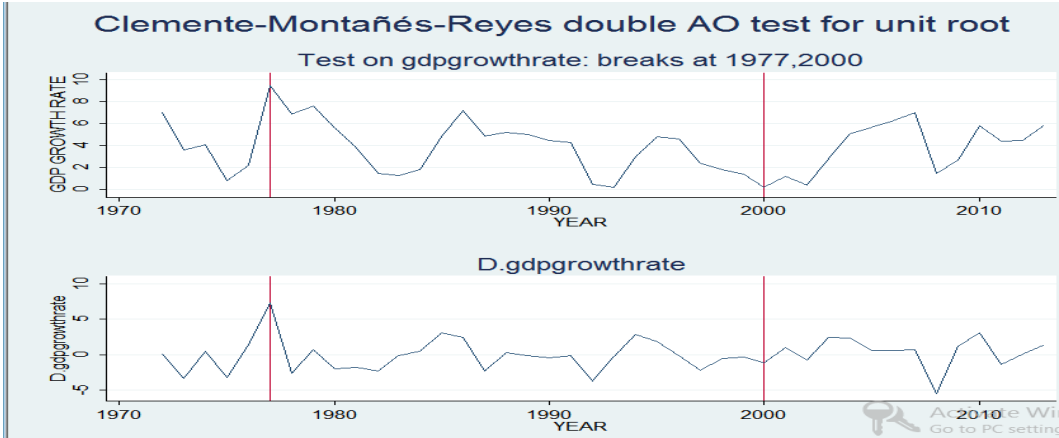


Figure A1: Clemente-Montañés -Reyes AO Test, GDP Growth Rate.

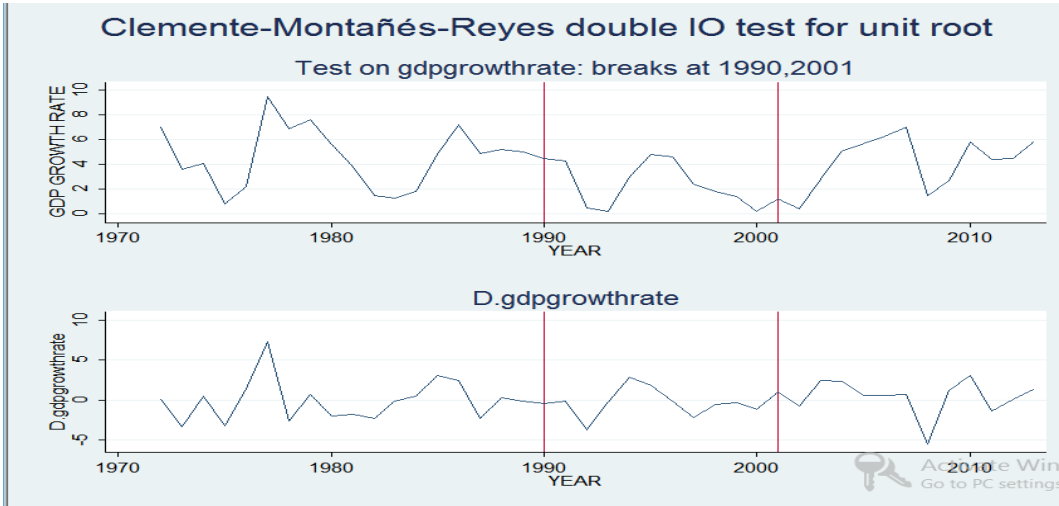


Figure A2: Clemente-Montañés -Reyes IO Test, GDP Growth Rate.

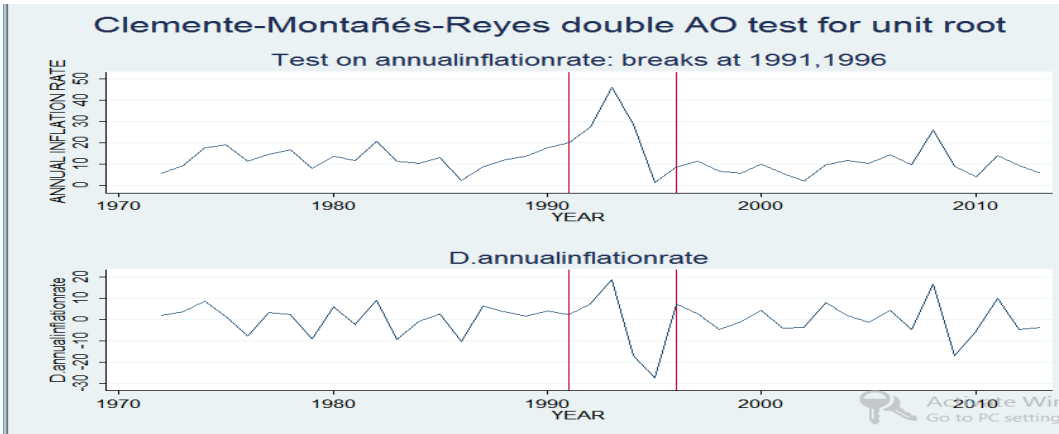


Figure A3: Clemente-Montañés -Reyes AO Test, Inflation.

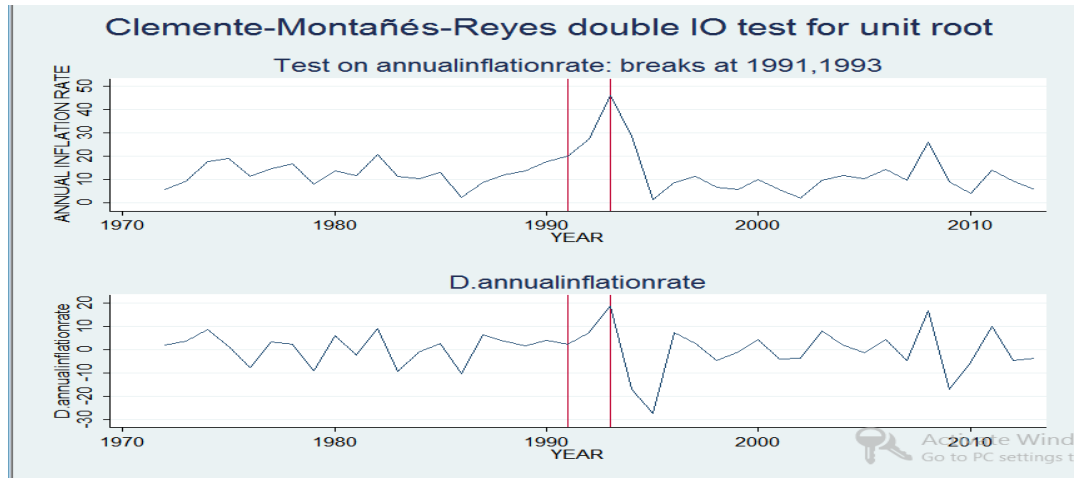


Figure A4: Clemente-Montañés -Reyes IO Test, Inflation

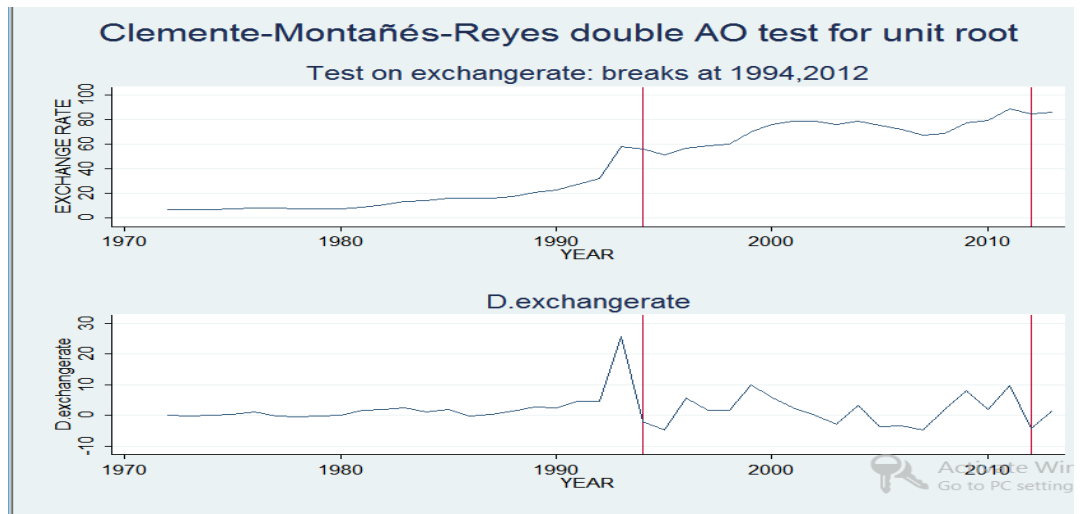


Figure A5: Clemente-Montañés -Reyes AO Test, Exchange Rate

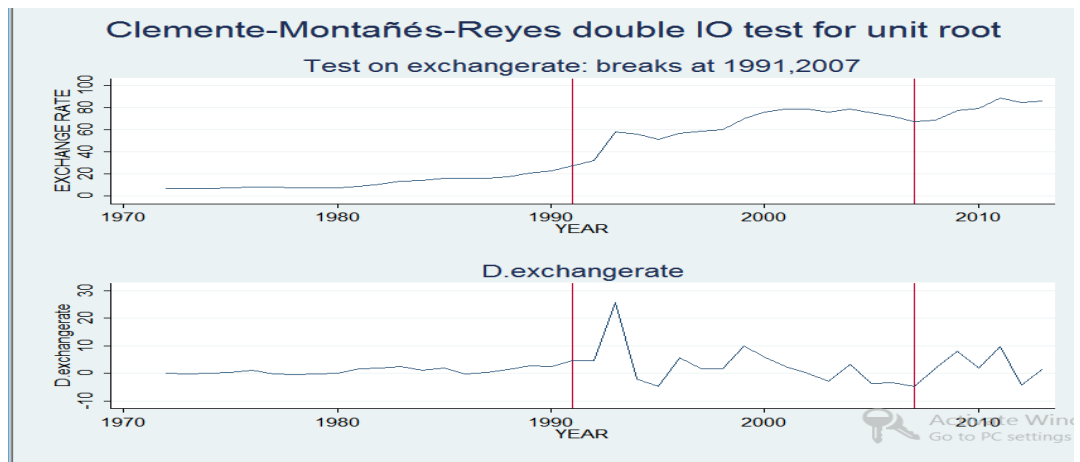


Figure A6: Clemente-Montañés -Reyes IO Test, Exchange Rate

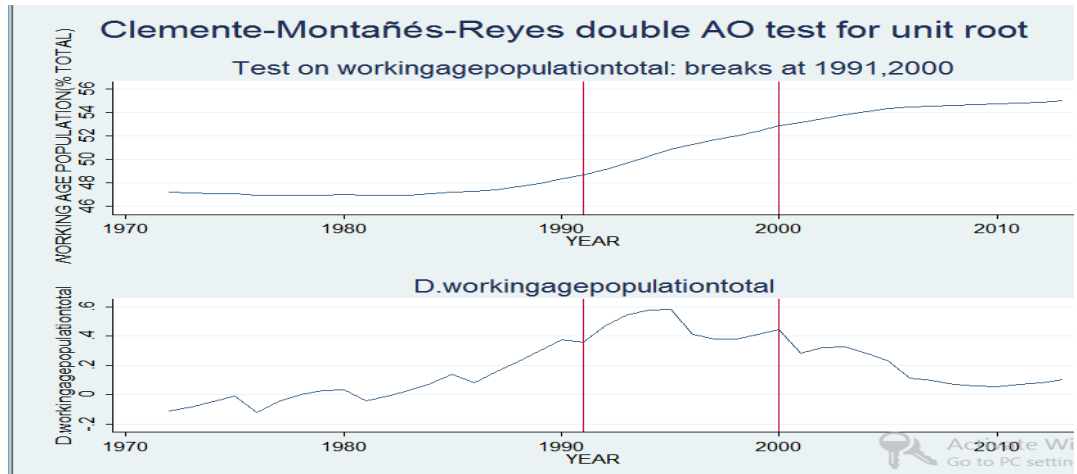


Figure A7: Clemente-Montañés -Reyes AO Test, Working Age Population

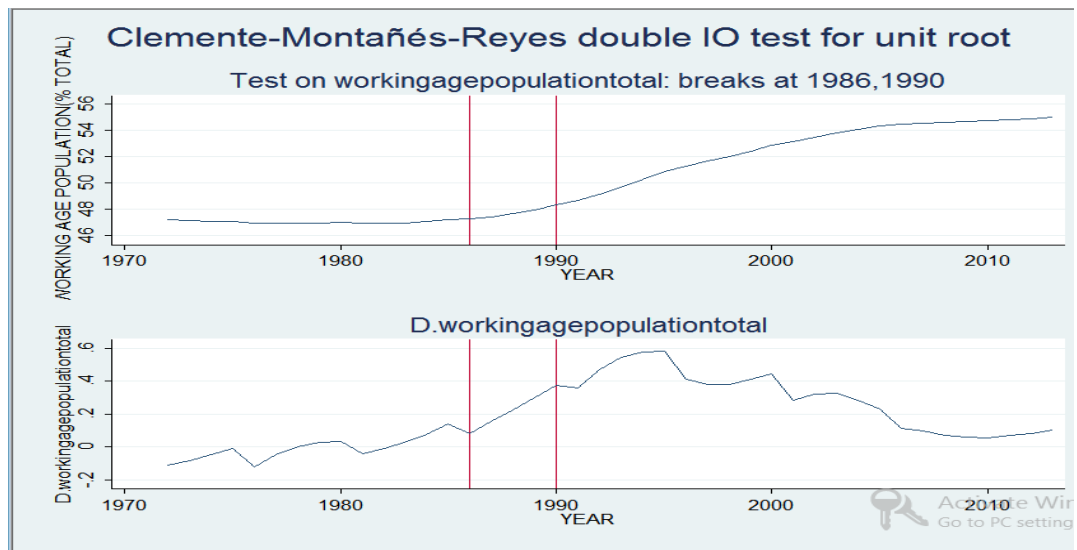


Figure A8: Clemente-Montañés -Reyes IO Test, Working Age Population

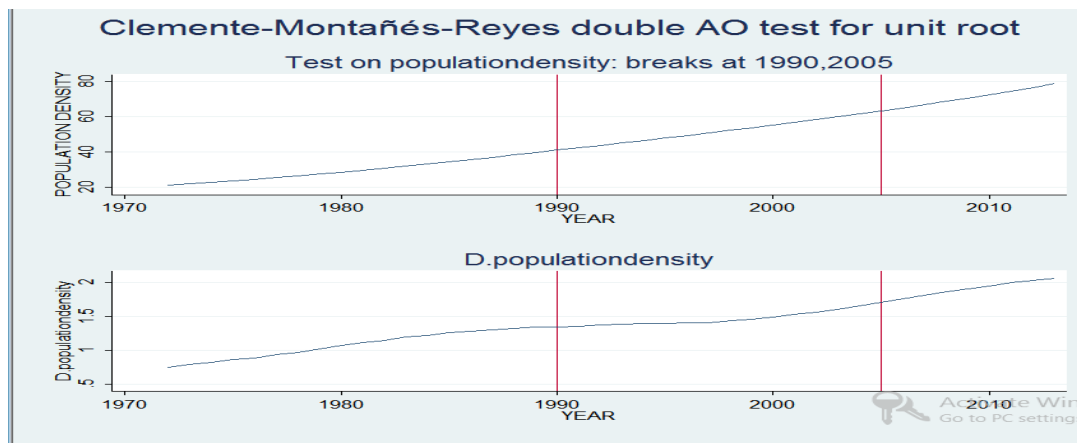


Figure A9: Clemente-Montañés -Reyes AO Test, Population Density

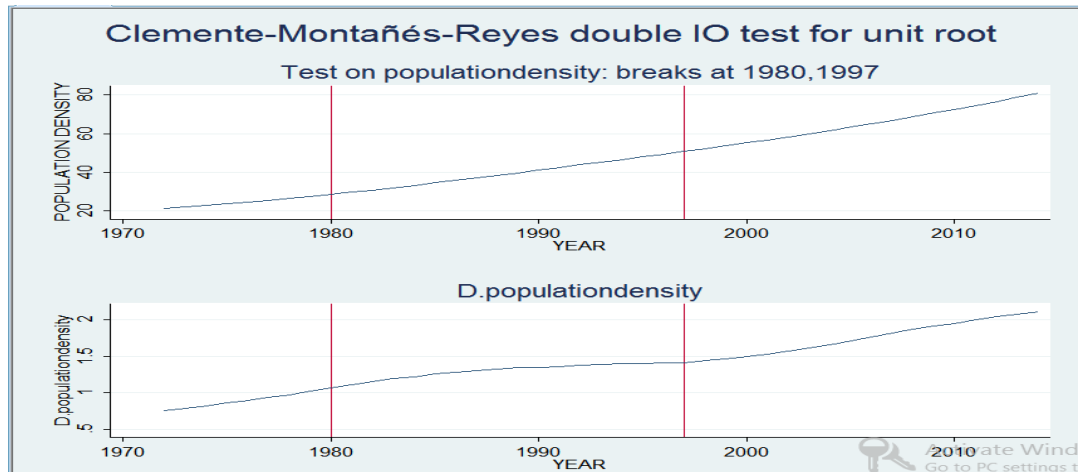


Figure A10: Clemente-Montañés -Reyes IO Test, Population Density

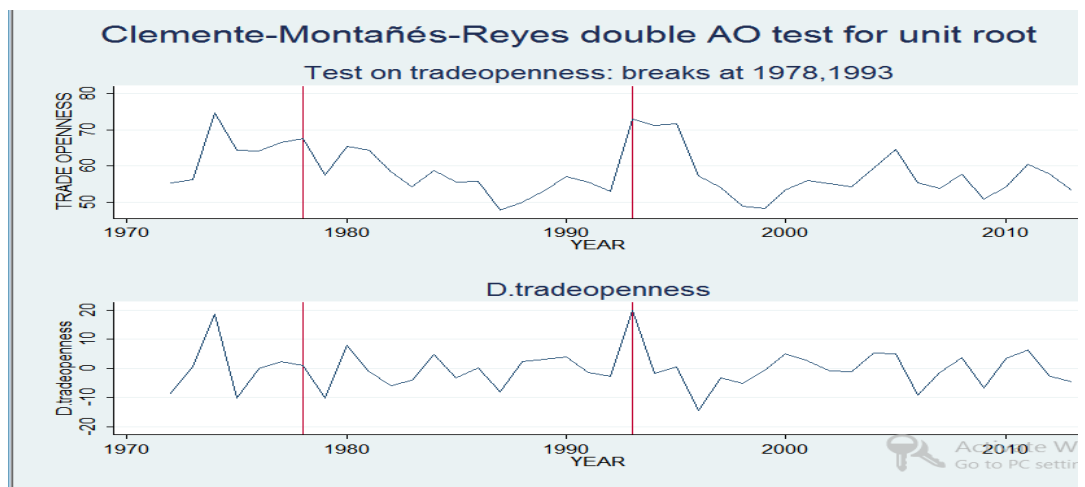


Figure A11: Clemente-Montañés -Reyes AO Test, Trade Openness

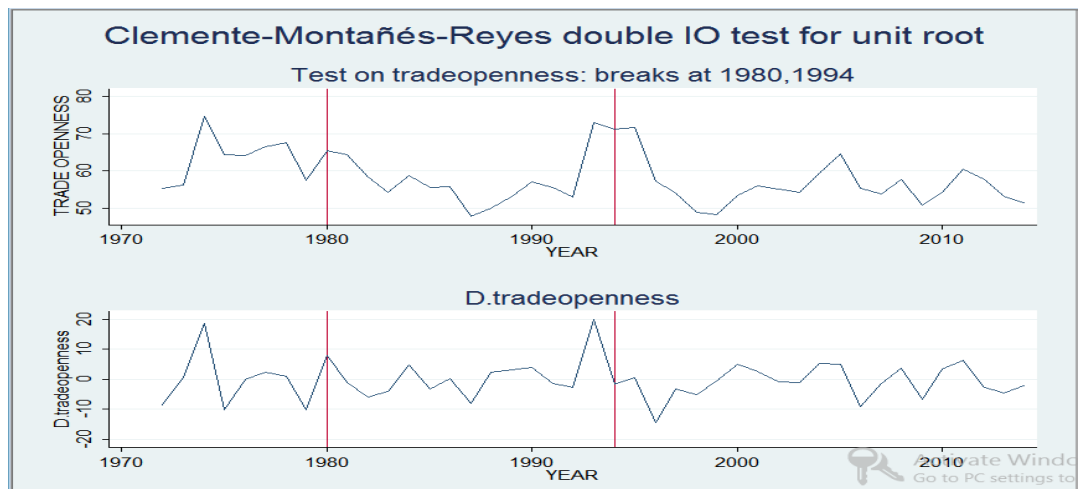


Figure A12: Clemente-Montañés -Reyes IO Test, Trade Openness

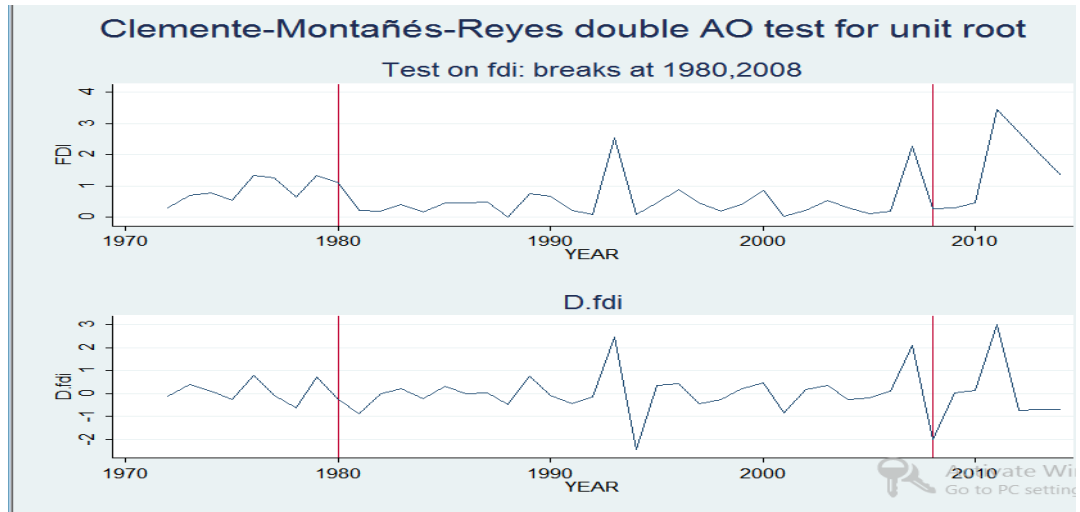


Figure A13: Clemente-Montañés -Reyes AO Test, FDI

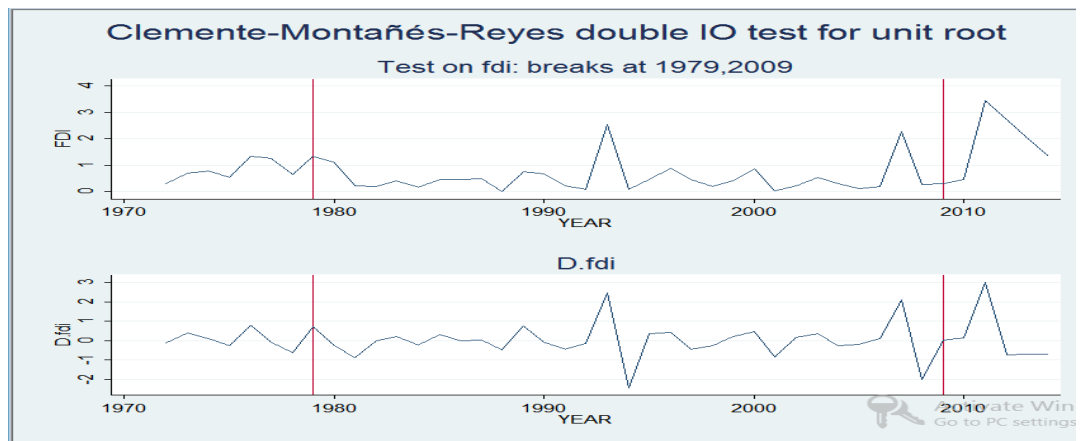


Figure A14: Clemente-Montañés -Reyes IO Test, FDI

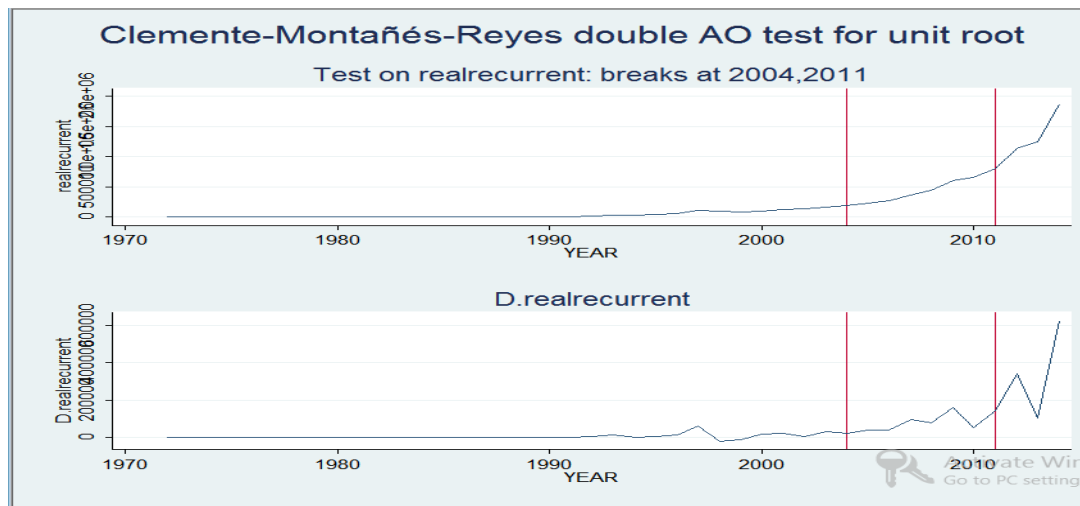


Figure A15: Clemente-Montañés -Reyes AO Test, Recurrent Expenditure

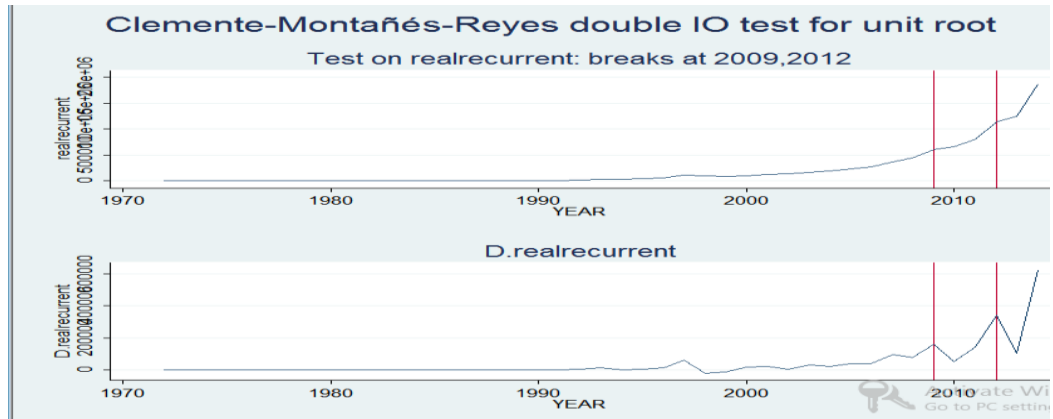


Figure A16: Clemente-Montañés -Reyes IO Test, Recurrent Expenditure

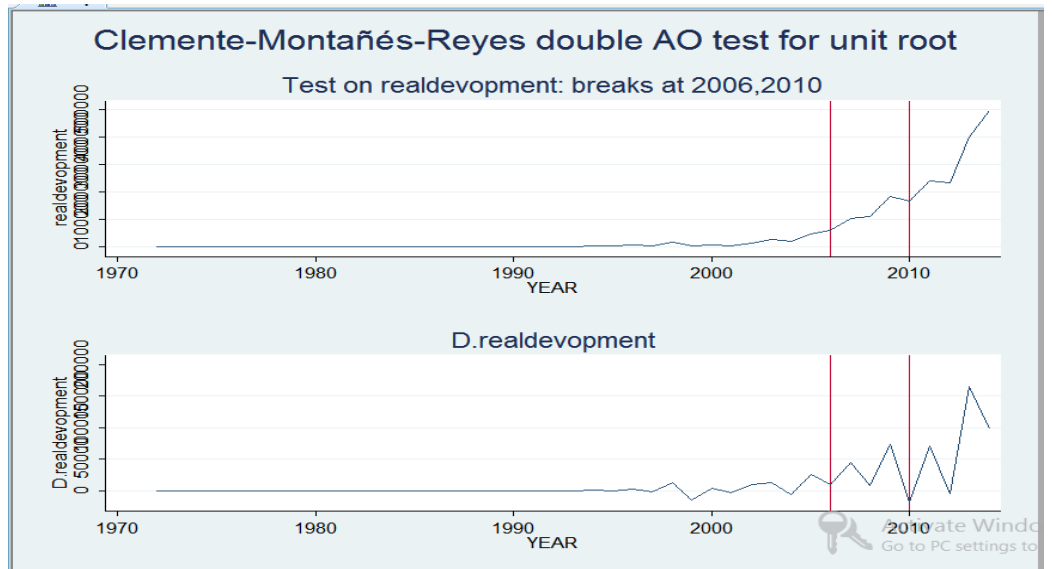


Figure A17: Clemente-Montañés -Reyes AO Test, Development Expenditure

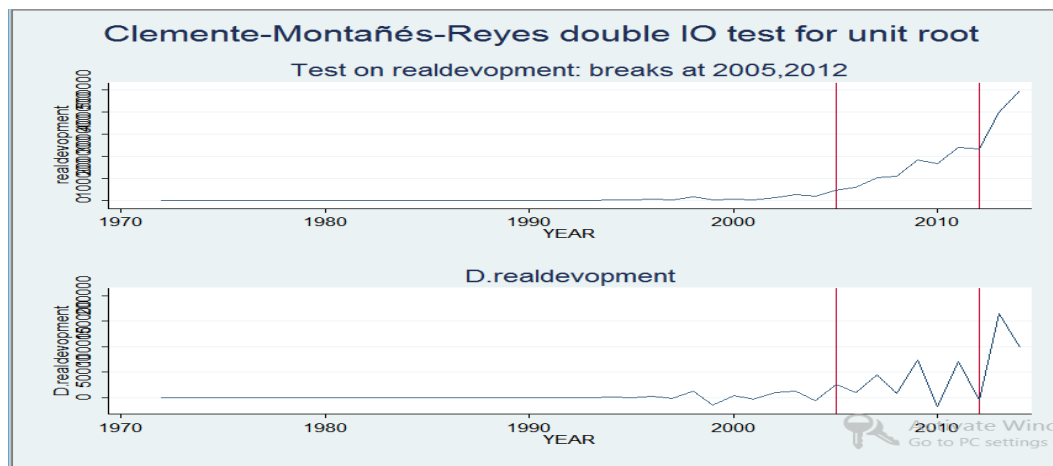


Figure A18: Clemente-Montañés -Reyes IO Test, Development Expenditure

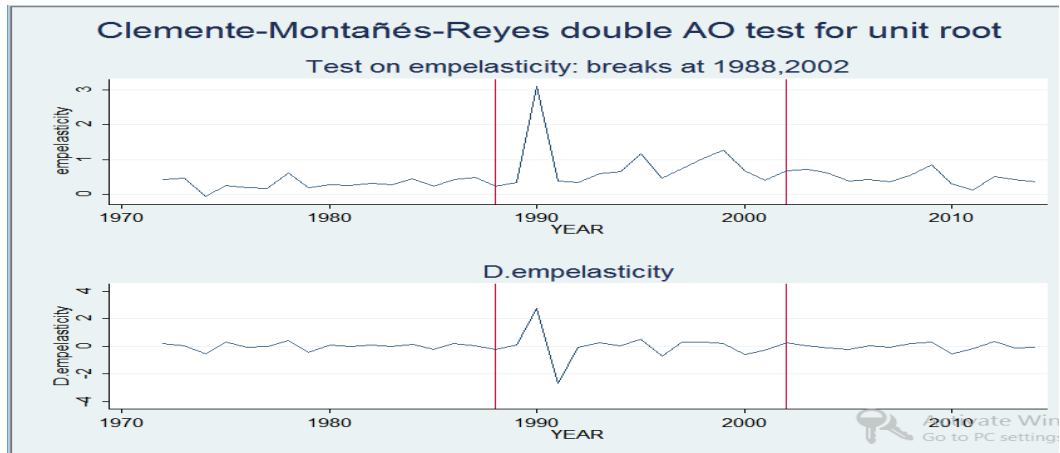


Figure A19: Clemente-Montañés -Reyes AO Test, Employment Elasticity

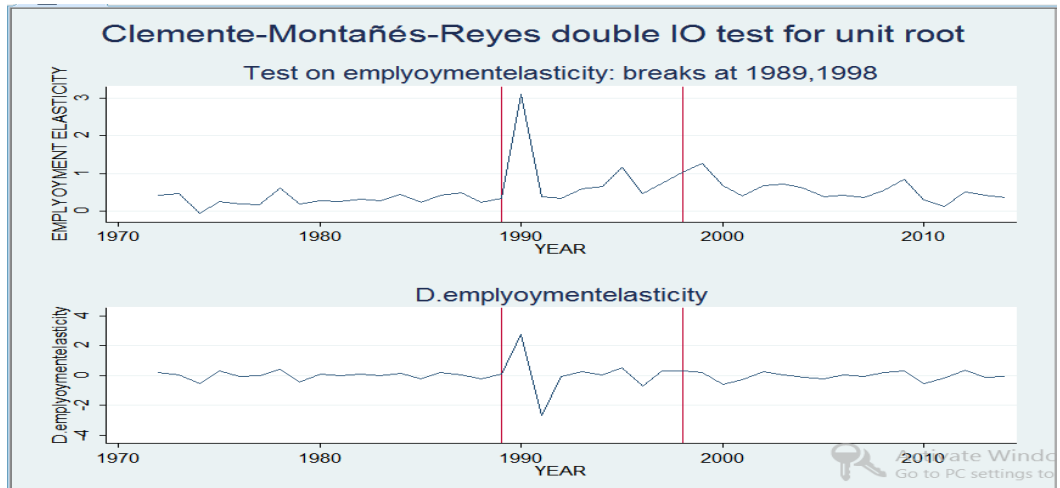


Figure A20: Clemente-Montañés -Reyes IO Test, Employment Elasticity

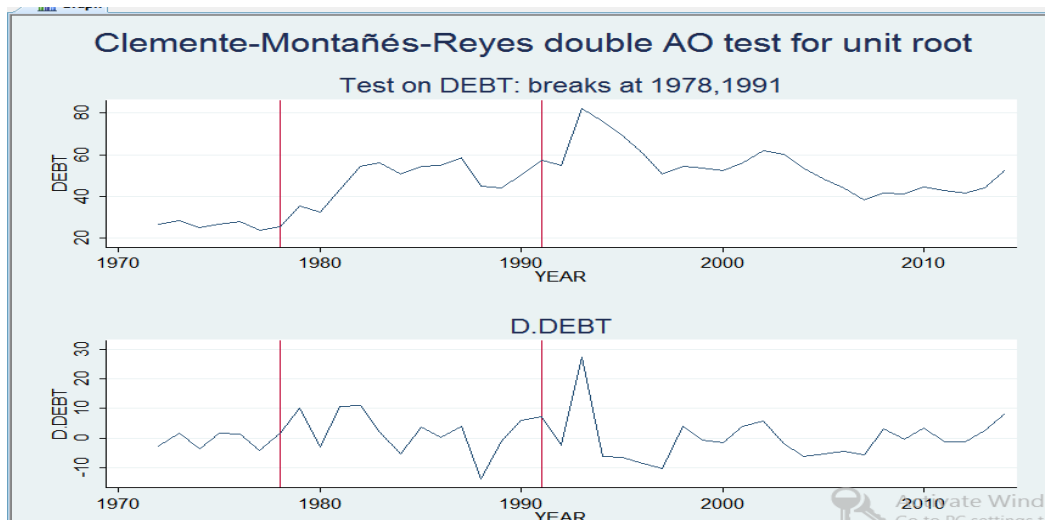


Figure A21: Clemente-Montañés -Reyes AO Test, Debt

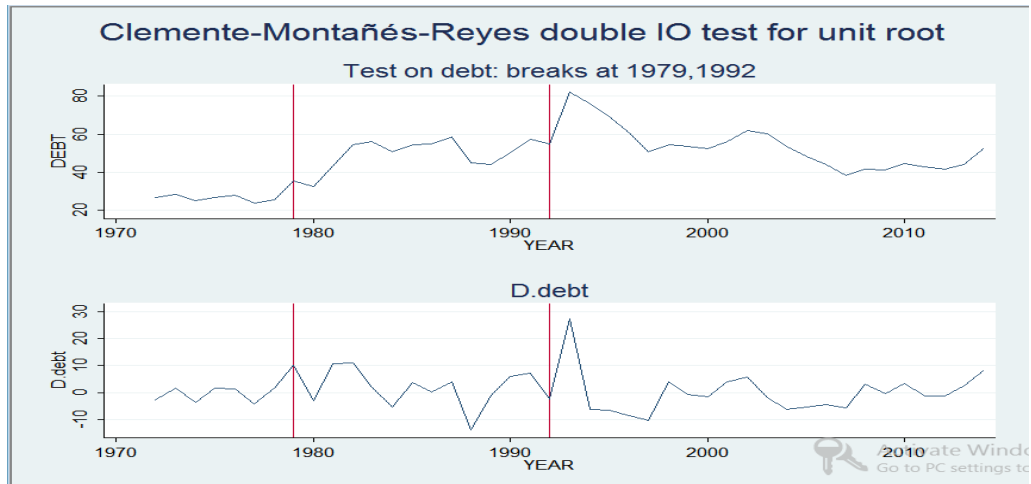


Figure A22: Clemente-Montañés -Reyes IO Test, Debt

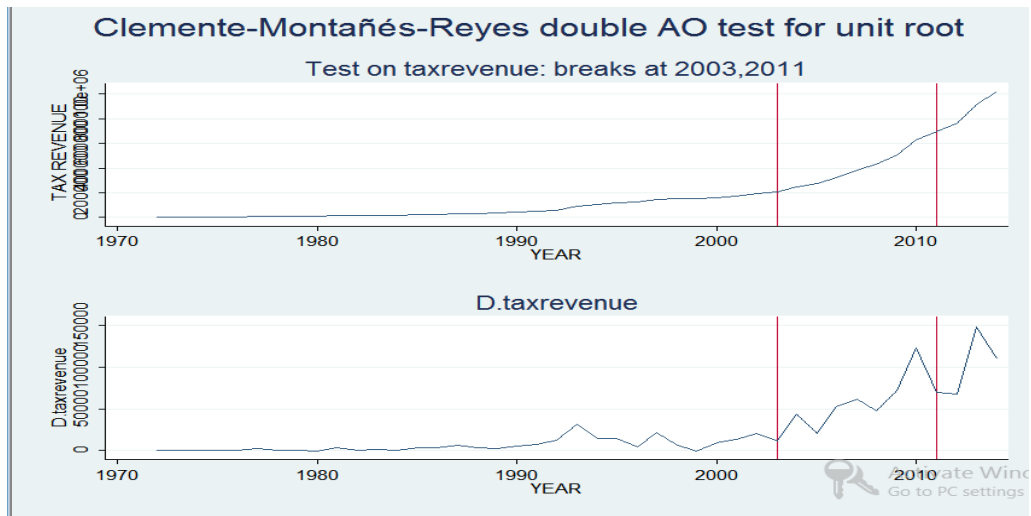


Figure A23: Clemente-Montañés -Reyes AO Test, Tax Revenue

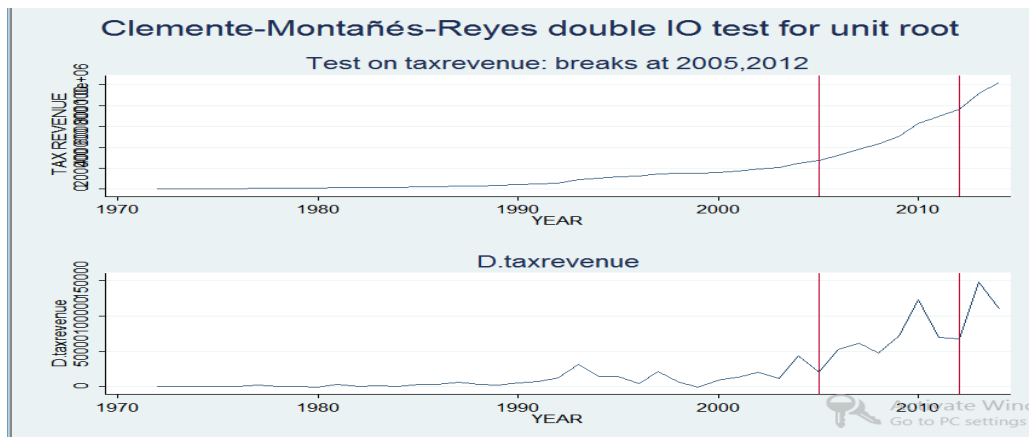


Figure A24: Clemente-Montañés -Reyes IO Test, Tax Revenue

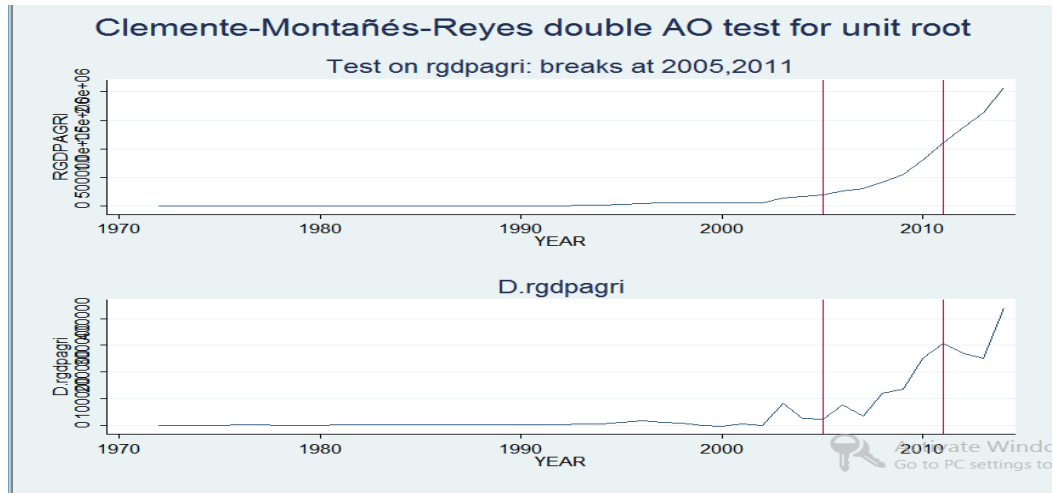


Figure A28: Clemente-Montañés -Reyes IO Test, GDP Agriculture

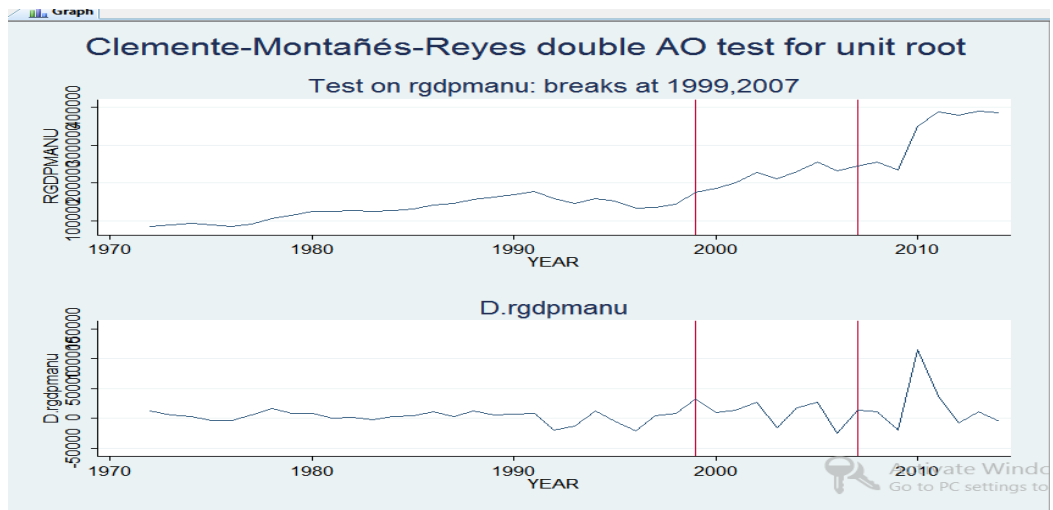


Figure A29: Clemente-Montañés -Reyes AO Test, GDP Manufacturing

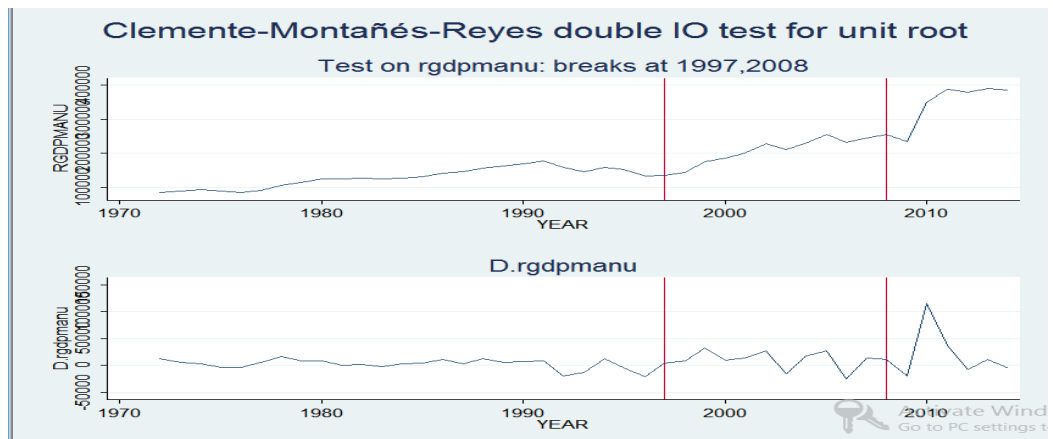


Figure A30: Clemente-Montañés -Reyes IO Test, GDP Manufacturing

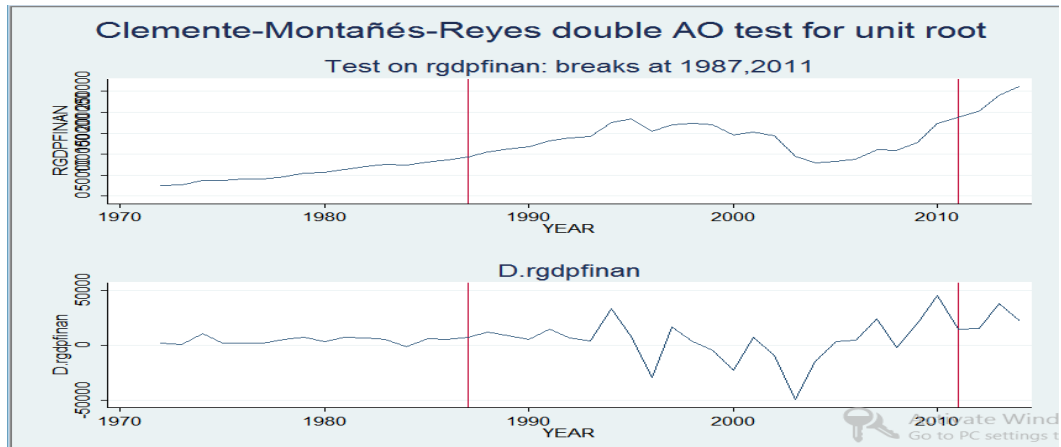


Figure A31: Clemente-Montañés -Reyes AO Test, GDP Finance

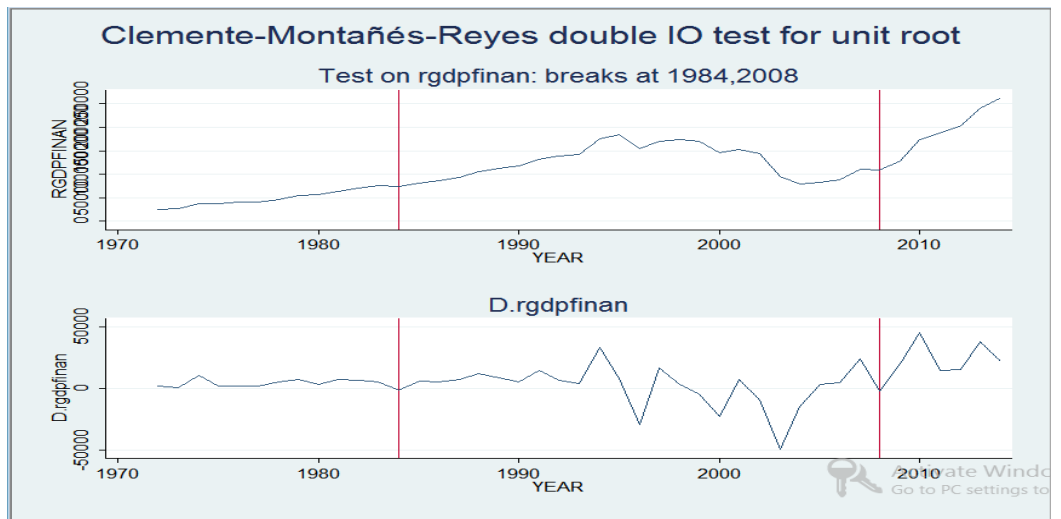


Figure A32: Clemente-Montañés -Reyes IO Test, GDP Finance

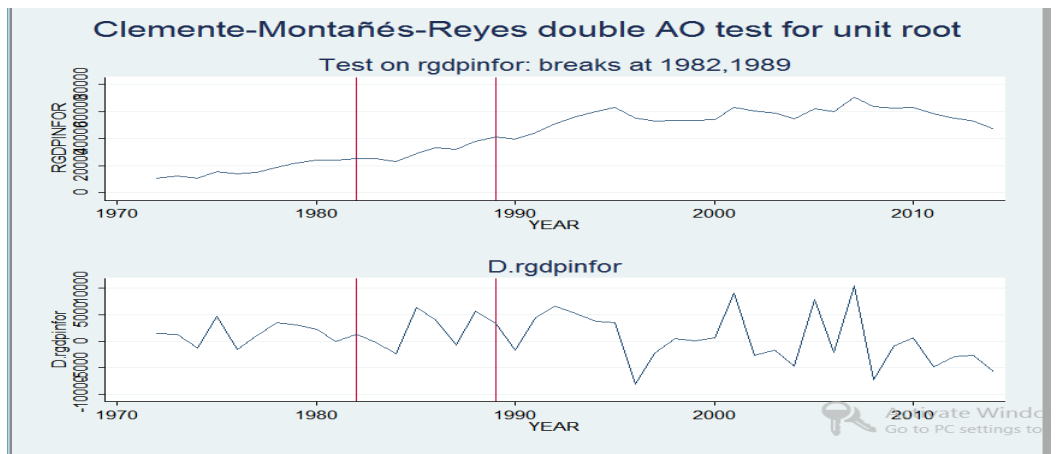


Figure A33: Clemente-Montañés -Reyes AO Test, GDP Information and Communication

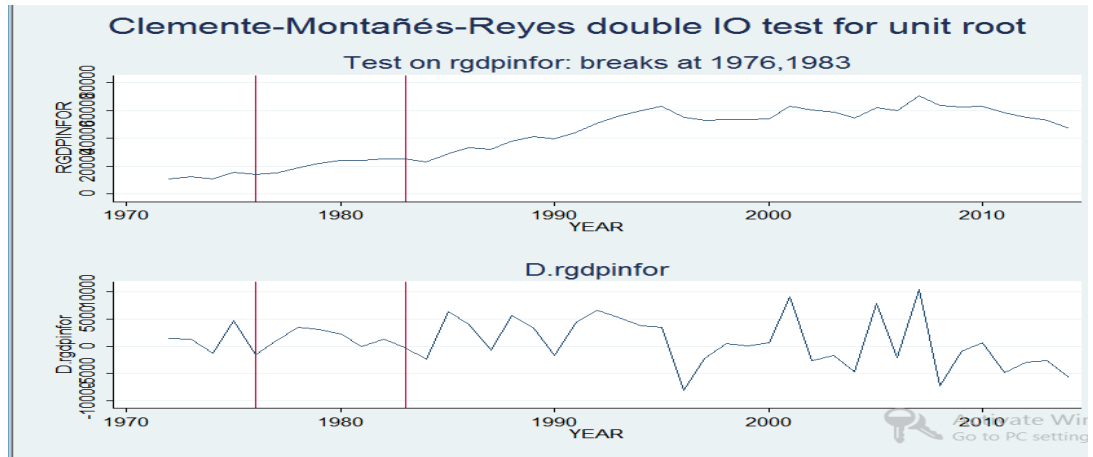


Figure A34: Clemente-Montañés -Reyes IO Test, GDP Information and Communication

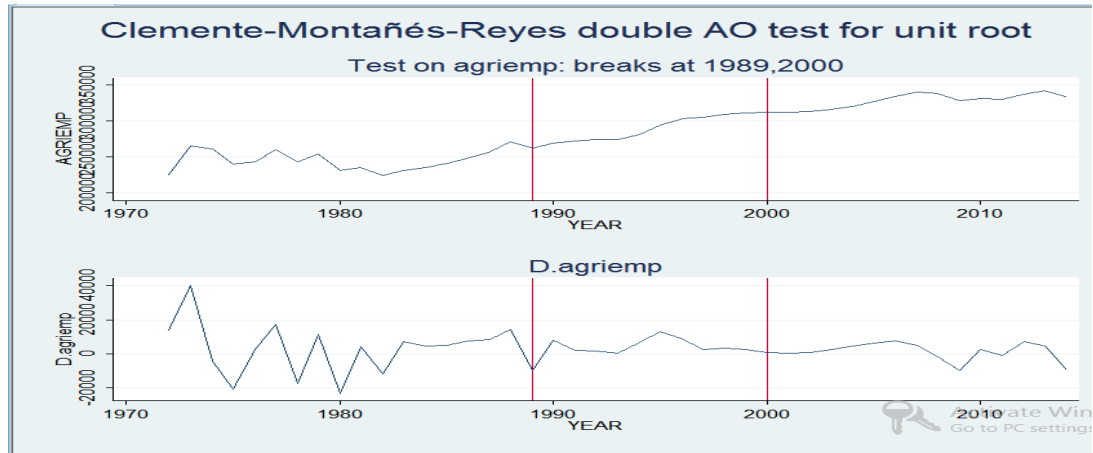


Figure A35: Clemente-Montañés -Reyes AO Test, Agriculture Employment

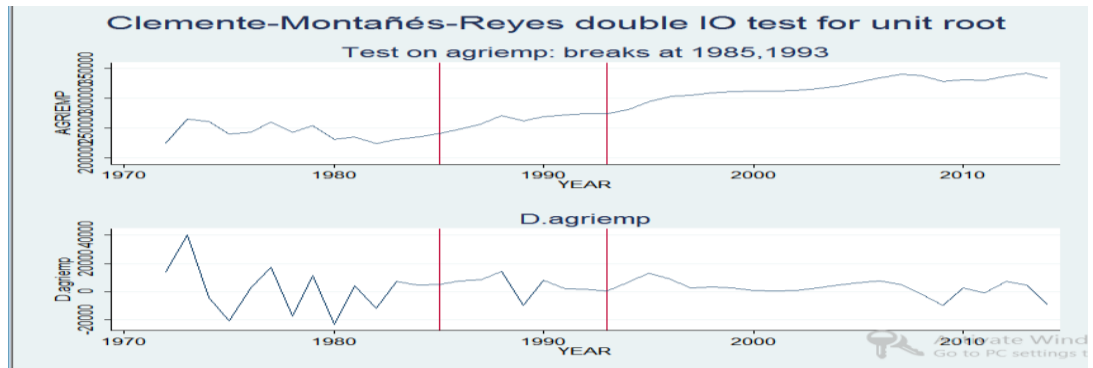


Figure A36: Clemente-Montañés -Reyes IO Test, Agriculture Employment

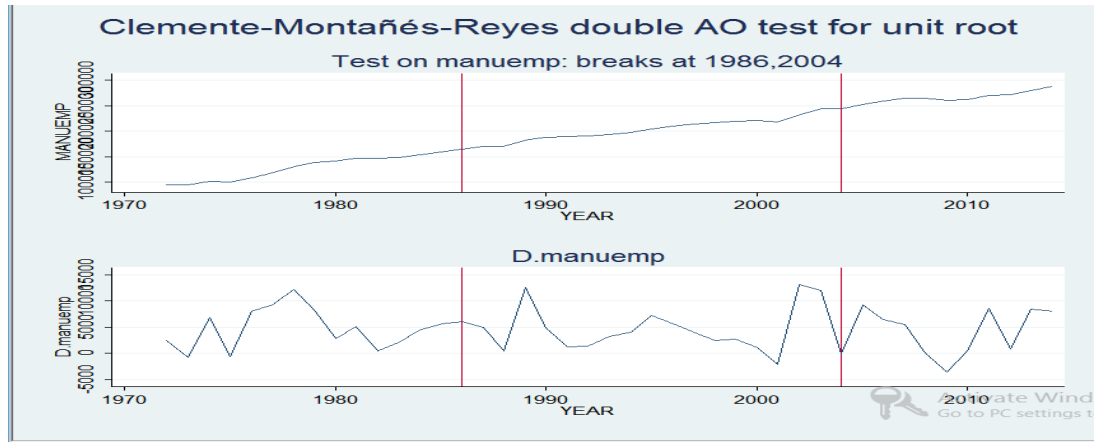


Figure A37: Clemente-Montañés -Reyes AO Test, Manufacturing Employment

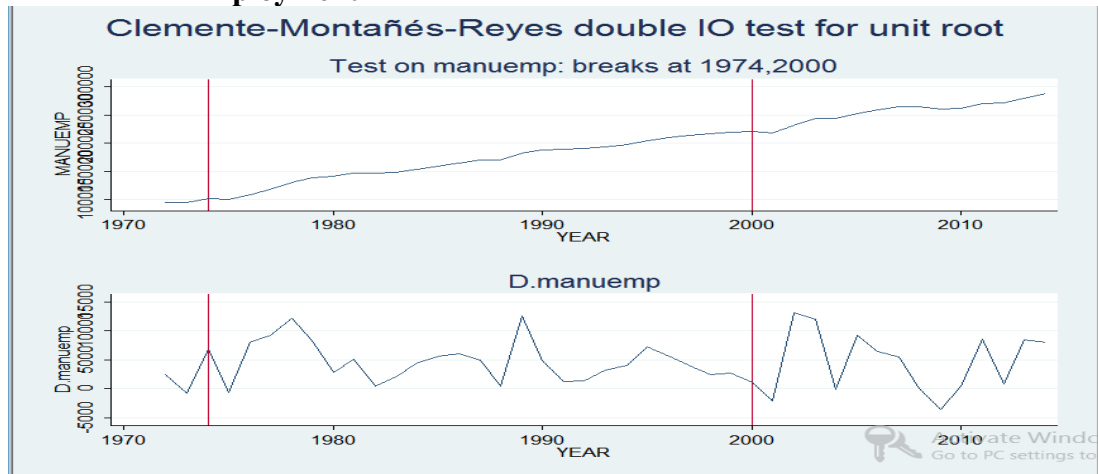


Figure A38: Clemente-Montañés -Reyes IO Test, Manufacturing Employment

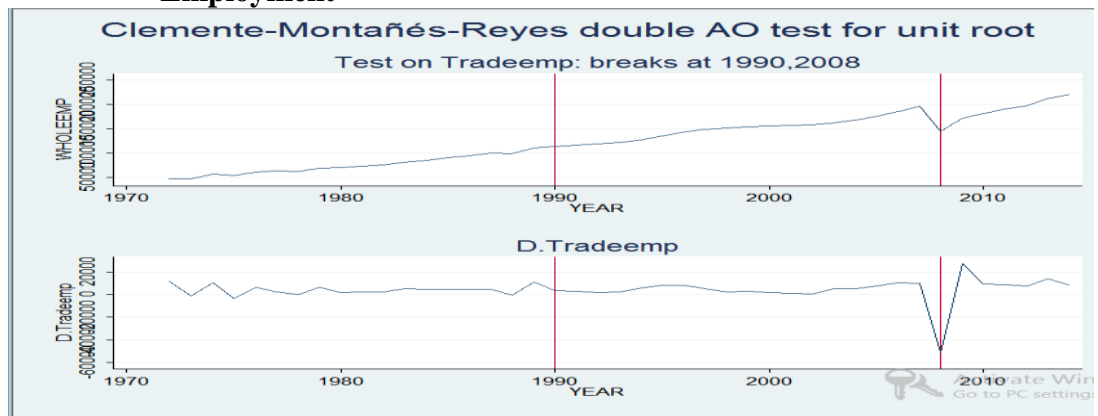


Figure A39: Clemente-Montañés -Reyes AO Test, Whole sale and Retail Employment

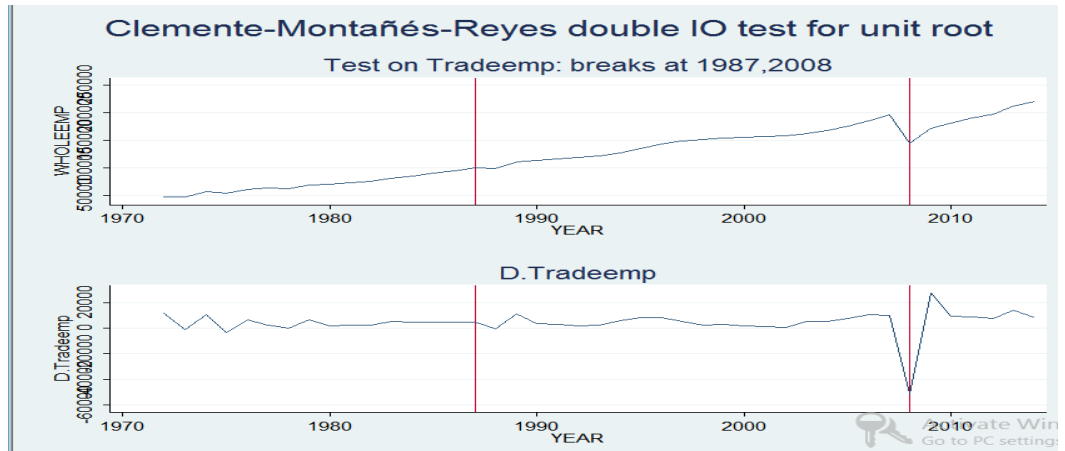


Figure A40: Clemente-Montañés -Reyes IO Test, Whole sale and Retail Employment

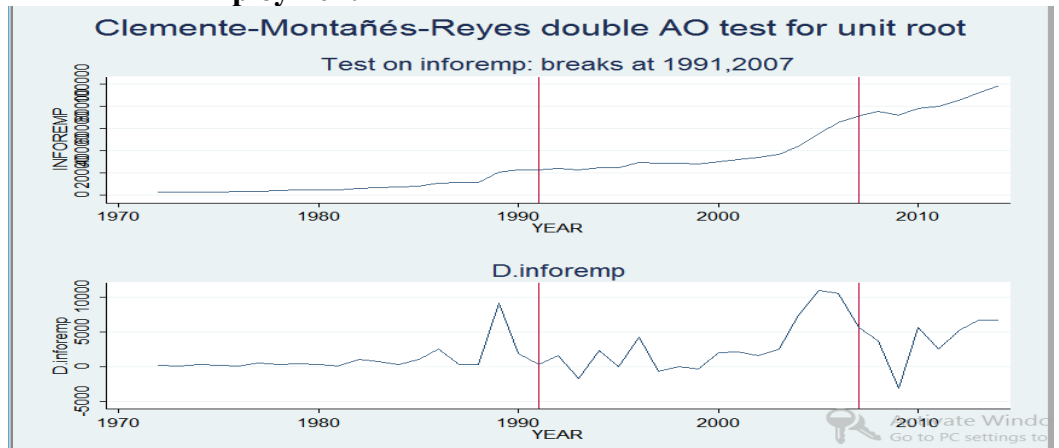


Figure A41: Clemente-Montañés -Reyes AO Test, Information and Communication Employment

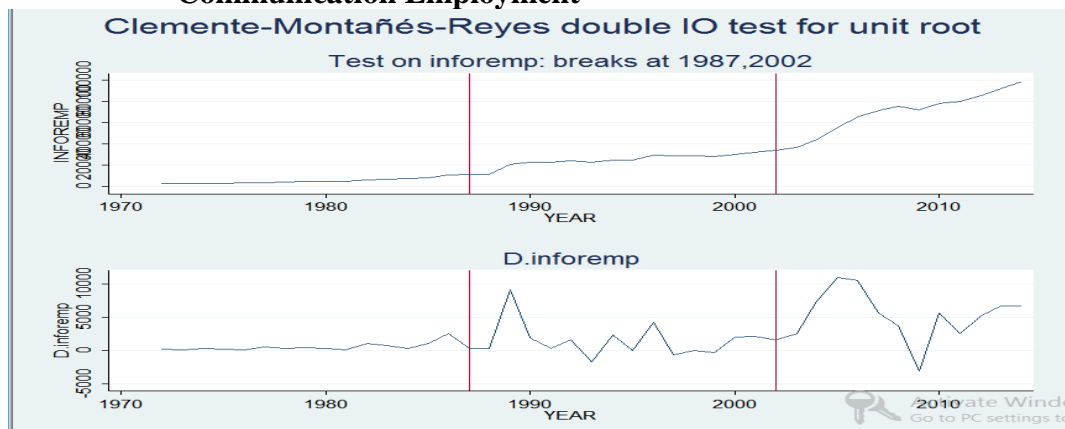


Figure A42: Clemente-Montañés -Reyes IO Test, Information and Communication Employment

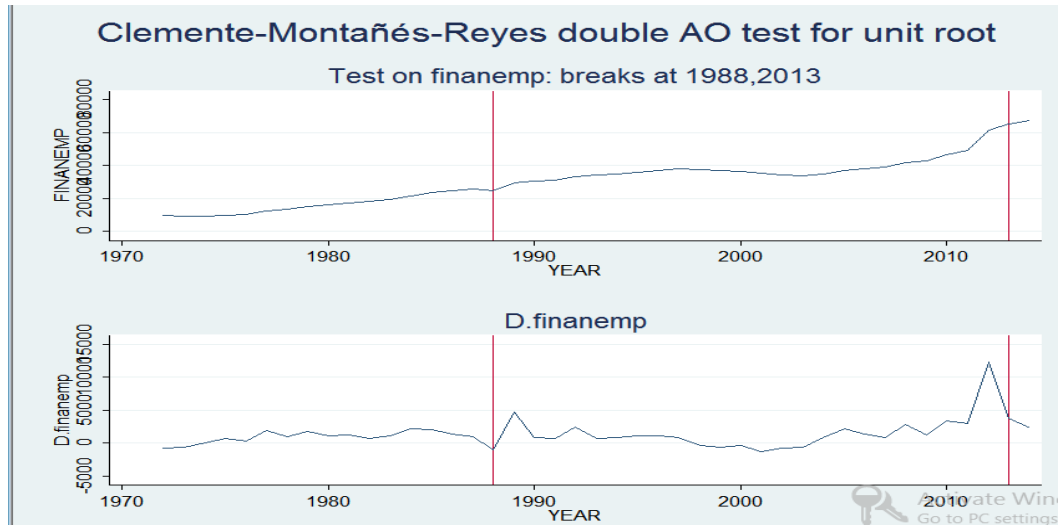


Figure A43: Clemente-Montañés -Reyes AO Test, Finance Employment

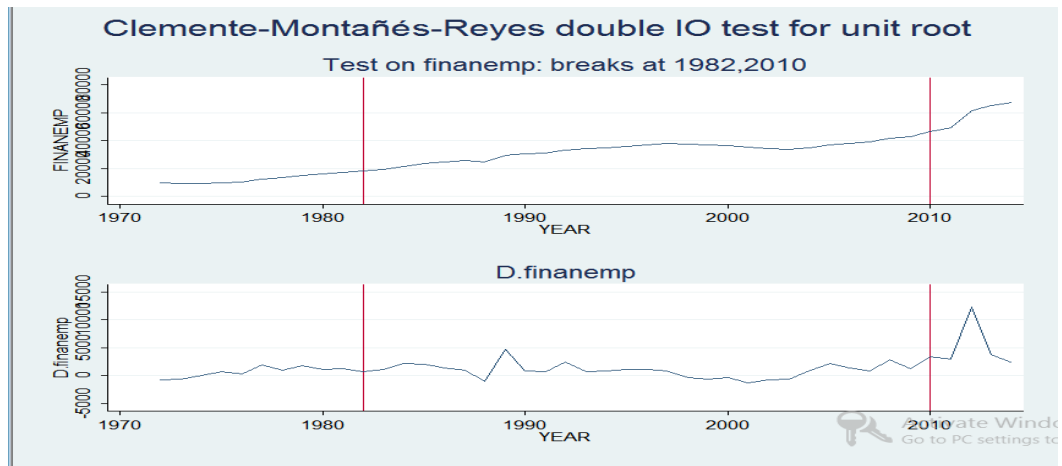


Figure A44: Clemente-Montañés -Reyes IO Test, Finance Employment

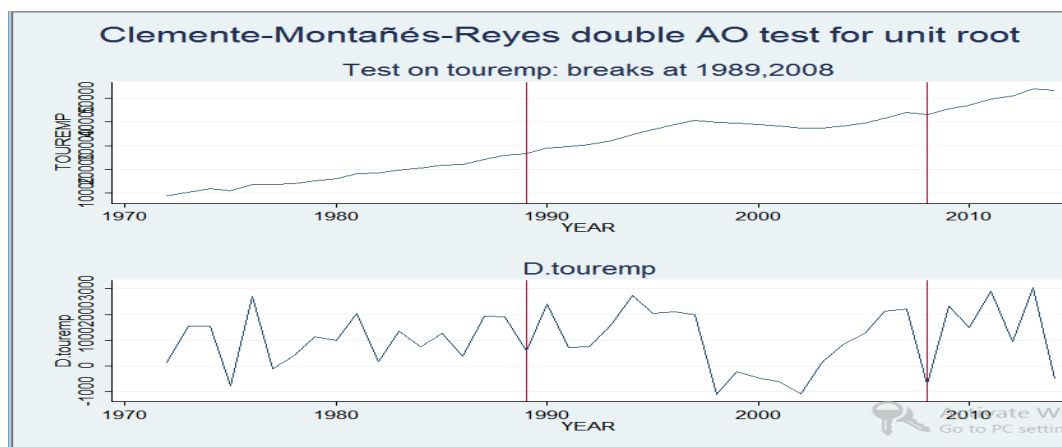


Figure A45: Clemente-Montañés -Reyes AO Test, Tourism Employment

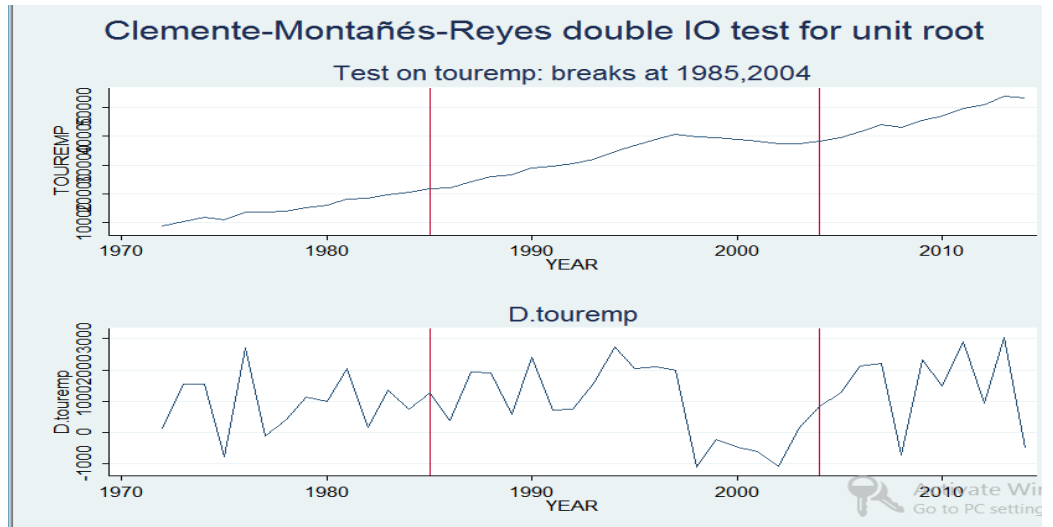


Figure A46: Clemente-Montañés -Reyes IO Test, Tourism Employment