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Has Kenyan Growth Been Inclusive? Examining Employment Intensity of Sectoral Output

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Abstract

Debate has emerged about inclusivity of Kenya's economic growth with constant concerns on its ability to create adequate employment for the ever-increasing number of job seekers. While it is strongly believed that pro-employment growth is an efficient means for attaining inclusive growth, creation opportunities for decent jobs, reduction of poverty and income inequality remains one of Kenya's key policy priority areas. Using a unique sector-level gross value added and employment data sets on the Kenyan economy over the period 1978-2017, we examine the employment intensity of Kenya's sectoral output, specifically to ascertain which sectors are employment-intensive and thus job creating. Due to the perceived interrelationships among the sectors, we adopt the seemingly unrelated regression (SUR) model consisting of nine single equations. The model was fit using the SUR estimator. Empirical findings provide evidence that overall employment elasticity in the economy is inelastic and stood at 0.24 per cent, implying that for a one per cent increase in GDP, employment will increase by 0.24 per cent for the overall economy. Sectoral output elasticities, on the other hand, ranged from -0.04 per cent in the agriculture sector to 0.37 per cent in the trade and hospitality sector. Our study further provides evidence that sector-level output impacts on employment creation differently, thus some sectors are more inclusive than others. The sector that is more inclusive is trade and hospitality sector, followed by community and social services sector, then finance and business services sector, construction sector and transport sector. We find negative elasticity for the agriculture sector, implying that sectoral growth is mainly productivity driven. From our findings, it is important that the Government recognizes the sectoral difference in job creation and, therefore, tailor inclusive growth strategies in response to different sectoral employment elasticities of growth. This is critical in the Kenyan case given the dominance informal sector employment, mainly constituting small and medium enterprises.

Abbreviations and Acronyms

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criterion
ASGTS	Agricultural Sector Growth Transformation Strategy
CES	Constant Elasticity of Substitution
CPI	Consumer Price Index
GDP	Gross Domestic Product
GoK	Government of Kenya
GVA	Gross Value Added
ISIC	International Standard Industrial Classification
KIHBS	Kenya Integrated Household Budget Survey
KNBS	Kenya National Bureau of Statistics
MTPs	Medium-Term Plans
OLS	Ordinary Least Squares
SBIC	Schwarz-Bayesian Information Criterion
SMEs	Small and Medium Enterprises
SUR	Seemingly Unrelated Regression
SVAR	Structural Vector Autoregressive
UNDP	United Nations Development Programme

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1. Introduction

The 2006 Resolutions of the Economic and Social Council of the United Nations highlight the centrality of employment to inclusive growth and poverty eradication. The Resolutions reaffirm the cruciality of accelerated employment growth in reducing poverty, since labour income constitutes the main source of income for the poor. These sentiments are further emphasized in the Sustainable Development Goal 8, which puts at the core full and productive employment and decent work as central to achievement of inclusive and sustainable economic growth.

Although there is yet no widely agreed formal definition for inclusive growth, a consensus on what it entails emerges from policy statements of various countries and their development partners, and from discussions on development policies in economic and social literature. Studies exploring economic growth and welfare of people agree that output growth alone is necessary, but not sufficient, for a country to improve the standards of living of its inhabitants (Dollar and Kraay, 2002; Hull, 2009). What matters for growth to lead to poverty reduction and improving standards of living is the pattern and sources of growth and how its benefits are distributed (Islam, 2004). In the same vein, Mello and Dutz (2012) argue that economic growth is important but not sufficient to generate sustained improvements in welfare, unless the dividends of growth are shared fairly among individuals and social groups.

Klasen (2010) defines *inclusive growth* as growth that is broad-based and benefits everyone in society - the poor, middle income groups and even the rich. According to a 2009 World Bank study by Ianchovichina and Lundstrom (2009), inclusive growth analytics largely focus on the pace and pattern of growth, which are crucial for poverty reduction. The study posits that inclusive growth entails more broad-based growth that involves a large part of the country's labour force, who are either trapped in low-productivity activities or completely excluded from the growth process. Economic growth will be inclusive if it benefits everyone and addresses the challenges that are faced by the poor, especially in access to opportunities for participation in the growth process.

Ali and Zhung (2007) put forward the idea that inclusive growth is a concept that goes beyond broad-based growth. It is "growth that not only creates new economic opportunities, but also one that ensures equal access to the opportunities created for all segments of society". Growth is inclusive when it allows all members of a society to participate in and contribute to the growth process on an equal basis regardless of their individual circumstances. According to the United Nations Development Programme (UNDP) perspective, inclusive growth is understood as both an outcome and a process. It ensures that everyone can participate in the growth process in terms of decision-making and in terms of participating in growth itself. Inclusive growth is one whose benefits are shared equitably. Inclusive growth thus implies participation and benefit-sharing.

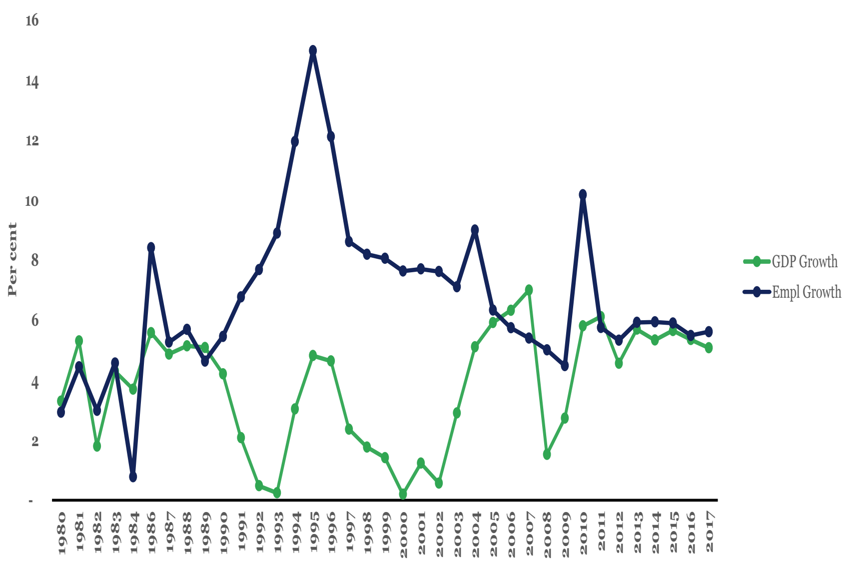
The fundamental element for inclusive growth has been assumed to be productive employment, given that employment growth generates new jobs and income for the individual while productivity growth has the potential to lift the wages of those employed and the returns to the self-employed (Ianchovichina and Lundstrom, 2009; Islam, 2004; Bhalla, 2007). Productive employment is an important source of income security for the majority, given its contribution towards individuals' broader social and economic advancement. This is specifically important for a country such as Kenya where most of the populace participate in the growth process through provision of labour.

From the foregoing perspectives on inclusive growth, it can be concluded that for economic growth to be considered inclusive, it must: involve a large part of the country's labour force; benefit everyone; and support welfare improvements and poverty eradication. In this study, the working definition for inclusive growth is growth that is broad-based and job creating. It is growth that increases participation of majority into the growth process. The argument is that for a small developing economy such as Kenya, the main channel through which the benefits of economic growth can be transmitted to the majority is employment generation arising from economic expansion. Labour is about the only resource that over 80 per cent of Kenyans own. For this group, enjoying the benefits of economic growth and overcoming poverty is through employment.

Inclusive growth has been part of Kenya's development agenda since independence, particularly through the pursuit of social equity and equitable access to economic resources. Concerns have, however, arisen with regard to the extent of disparities between the rich and poor and inequitable distribution of economic resources between individuals, regions and along gender lines. The Government of Kenya through its economic blueprint, the Kenya Vision 2030 and the various Medium-Term Plans (MTPs), emphasizes its commitment to transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment. This is to be achieved partly through macroeconomic stability, growth, employment and job creation, privatization, improving the business climate to attract international private-sector investment, and reduce corruption. This study looks at growth and employment creation as an aspect of inclusiveness of economic growth.

A review of Kenya's growth experience reveals that economic growth has been quite episodic. Figure 1.1 shows the trend in Gross Domestic Product (GDP) growth and employment growth for the period 1980 to 2017. Over the review period, the rate of economic expansion has not been in tandem with employment growth. Between 1991 and 1995, the country experienced a sharp rise in employment, attributable to liberalization policies and renewed government strategies towards promotion of growth and development of the informal sector, such as small enterprises and Jua Kali sector development, facilitating access of small and medium enterprises (SMEs) to credit, non-financial promotion programmes, markets and marketing information; enhancing legal and regulatory environment, and promoting technological development and transfer amongst the SMEs; and job creation in the rural economy, especially in agriculture and urban informal sector (Omolo, 2010). During this phase, informal sector employment increased by an average of 42 per cent while GDP remained positive but on a decline. Between 2002 and 2007, GDP rapidly increased while employment was declining, implying productivity-led growth. After 2010, economic growth rebounded, albeit stabilizing at lower levels compared to 2007. This rebound came after economic slowdown following the 2008 post-election violence and the 2008 global financial and economic crisis. During the economic recovery, both GDP and employment were on upward trend, although the growth rate of GDP was higher than the rate of employment growth. It is therefore evident from exposition above that growth rate in employment and GDP are not always in sync.

Figure 1.1: Trends in economic growth and employment in Kenya



Data Source: Kenya National Bureau of Statistics (Various), Statistical Abstracts and various State Department of Planning (Various), MTPs

Note: Empl growth means employment growth rate

Data frm the Kenya Integrated Household Budget Survey (KIHBS 2015/16) indicate that between 2005/06 and 2015/16, total employment grew by 29 per cent while total number of unemployed grew by 26 per cent, implying that for every 1 per cent growth in employment, there is 0.89 per cent growth in unemployment. The report also indicates that during the same period, total labour force increased from 14.6 million to 19.3 million (32% increase). Essentially, for economic growth to benefit all and be considered inclusive, less of unemployment should be experienced as more people enter job market.

While the Kenyan government acknowledges that creation of employment opportunities is a key avenue to combating poverty and inequality (Government of Kenya, 2012 Third Annual Progress Report), restoring and sustaining high economic growth while at the same time generating gainful employment remains one of the greatest challenges. The growth in employment has fallen short of the growth in the labour force, leading to high unemployment rates. The inability to create adequate jobs at a faster pace than the growth in the labour force has resulted in open unemployment, which was estimated at about 10.5 per cent of the labour force according to Pollin, Githinji and Heintz, (2007). They argue that the inability of the country to fully utilize the abundant resources (in this case labour) presents a case of market failure.

Despite the Kenya economy experiencing relatively higher levels of economic growth, it has been argued that the country's economic model has not been inclusive, given the high levels of poverty and increasing pool of unemployed, particularly among the youth (World Bank, 2016). The foregoing underscores the need to examine the possibility that the episodes of growth experienced in Kenya are indeed job-creating. This study seeks to contribute to the existing knowledge by assessing whether economic growth in Kenya has been job creating, focusing on how sectoral employment intensity of output growth in Kenya has evolved over time with a view to identifying growth sectors that are employment-intensive. The study examines the responsiveness of employment in terms of quantity of employed persons to GDP growth, proxied by Gross Value Added (aggregate and sectoral).

The rest of the paper is organized as follows: section 2 reviews literature on economic growth and employment, while estimation techniques and the data are described in section 3. Section 4 presents the results and section 5 concludes the paper.

2. Literature Review

From literature, it is understood that early development theories were based on the premise that the benefits of economic growth would trickle down to the poor. Experience from all over the world, Kenya included, has shown that growth is central to all strategies for reducing poverty and creating jobs (World Bank, 2008). The Kenyan experience reveals that lack of growth in the early 1990s coincided with an increase in poverty and decline in human development indicators.

2.1 Theoretical Literature

Employment and economic growth

According to Keynes (1937), changes in employment result from changes in GDP through aggregate demand. This is contrary to the Classical theory where price of labour determines employment. Keynes view is that equilibrium is reached when full employment occurs in an economy. He related the effect of the relationship between savings and investment on aggregate demand and employment, such that increased savings can increase investment. However, if the expected rate of returns on investment is low, the level of investment will fall and, as a result, aggregate demand will fall. The deficiency in demand results in equilibrium, which will be less than full employment. Therefore, change in GDP through changes in aggregate demand determines the level of employment. Keynes theory supports the notion that an increase in economic growth should translate into increased employment until equilibrium is achieved.

Keynes further argued that unemployment results from low growth of effective demand and, with the existence of effective demand, employment rises. This supports his argument that GDP, through change in aggregate demand, determines the employment level. Hansen (2013) emphasizes that for economic growth to result in employment in an economy, then it should be 'labour-absorptive' in nature. This implies that there exists a direct relationship between employment and economic growth, and that the direction of causality runs from economic growth to employment. A similar view is held by Okun (1962) in his seminal contribution linking unemployment rate and economic growth in a country. He concluded that output depends on the amount of labour used in the production process, implying that there is a positive relationship between output and employment. Okun (1962) estimated a coefficient that gives the rate of change of real output for a given change in the unemployment rate. The coefficient postulates that 'for a 1 per cent decline in unemployment rate, the real GDP must grow by approximately 3 per cent faster than the growth rate of potential GDP over the same period'. This implies that the rate of economic growth must be equal to its potential growth to keep unemployment rate constant.

The production function theory has also been used to offer an explanation to the link between employment and production (output). Miller (2008) notes that the original idea behind use of production functions was the analysis of behaviour of an individual firm. However, with the limitations of national accounts data, macroeconomists came to the realization that the production function framework is useful for estimating certain parameters that cannot be directly measured from national accounts data, e.g. the elasticity of substitution between capital and labour. Mankiw (1995) notes that the invent of the aggregate production function by Solow (1956) paved way for the theory of macroeconomic dynamics by allowing the development of the production function with constant elasticity of substitution (CES). The neoclassical production function allows for substitution between capital and labour, with technology assumed as an exogenous factor of transformation of inputs into outputs. This work was further advanced by Arrow et al. (1961). Further inventions of the CES production function brought in the concept of human capital. Lucas (1988) and Romer (1986) postulate that transfer of ideas and human capital among individuals, firms and nations is a key ingredient of economic growth as it allows for infinite aggregate elasticity of substitution due to its positive spillover effects. The CES production function has thus been used in analyzing the transmission of economic growth into employment in the context of job creation and destruction.

2.2 Empirical Literature

From an empirical point of view, several studies have investigated employment intensity of output growth in various countries to establish the job-creating ability of economic growth. Some studies focused on single country analysis (Ajilore and Yinusa, 2011; Upender, 2006, Mkhize, 2019; Perugini, 2009) while other examined employment growth across space (Dopke, 2001; Gabrisch and Buscher, 2005). Further, analysis of the link between employment and growth has been analyzed from an aggregate perspective and sectoral perspective to establish industry-specific elasticities.

Dopke (2001) used cross-country and panel data to examine the employment elasticity of growth in Europe and selected industrial countries. The results revealed that the relation between growth and employment strongly depends on the variable chosen to represent the labour market situation. His results suggested that the employment intensity of growth is significantly influenced by the country's wage policy and institutional settings on the labour market. He argued that employment elasticity should not be regarded as a natural constant, but rather it can be influenced by policy measures, particularly wage policy.

Perugini (2009) investigates the nexus between employment and output growth in Italy using panel data for the period 1970-2004. The model included GDP and four regional dummies as explanatory variables. He found presence 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. Using data from 1990-2003 and using pooled regression, Seyfried (2011) examined the relationship between employment and economic growth in US ten largest states. The key variables were lagged employment and GDP growth lags up to lag 3. He found the elasticity of employment with respect to real GDP in the US to be 0.47, while for the specific states, the elasticities were ranging from 0.31 to 0.61.

Within the context of developing economies, a handful of authors have endeavoured to investigate the ability of economic growth to generate jobs. By estimating the determinants of unemployment in Namibia, Eita and Ashipala (2010) found a positive relationship between employment and total GDP, and between employment and GDP of the manufacturing sector. They also found a negative relationship between investment and unemployment. This means that increased investment results in decreased unemployment, thereby raising the employment level in an economy. The main variables used were real effective exchange rate, gross fixed capital formation, real wages, productivity (measures by GDP divided by employment) and price of crude oil. In a similar vein, Rad (2011) found an inverse relationship between high growth rates experienced by Jordan, and creation of productive jobs. A conclusion was reached that the government should move from low value-added production and exports to a sector that is more sustainable in terms of quality and wages.

In South Africa, Biyase and Bonga-Bonga (2007) used a Structural Vector Autoregressive (SVAR) technique to test existence of jobless growth in South Africa. They found that an increase in output leads to a small increase in employment, thereby rejecting the idea of jobless growth in South Africa. Similarly, Mahadea and Simson (2010) adopted the Harrod-Dorma growth model to analyse the challenge of low employment and economic growth in South Africa by regressing marginal employment effect against GDP. The study found that during the period under review, employment elasticity with respect to GDP was low at 0.1541. The long-run growth employment effect was found to be weak. Having used fewer variables that influence labour demand, their model might have suffered from the problem of omitted variables. Fofana (2001) used the production function approach to investigate the relationship between the level of employment and macroeconomic variables such as GDP, investment, public expenditure, and development aid in Côte d'Ivoire. The study found a negative relationship between employment and GDP, and concluded that there was possibility of existence of jobless growth in the country. The study opined that solely relying on macroeconomic equilibrium to tackle unemployment problem was not sufficient.

Whereas some of the foregoing studies examined the employment-growth relationship from an aggregate perspective, some authors have also explored sectoral elasticities with a view to determining industry-specific elasticities that describe structural changes over time. A study by Kapsos (2006) examined employment intensity of output between 1991 and 2003 for three (3) broad economic sectors (including agriculture, manufacturing and services) in a cross-country panel. Using a multivariate log-linear regression with country dummies, he found that the services sector of economies accounted for the highest share of employment elasticities. These results are supported by Mourre (2006), who used the CES production function framework as proposed by Arrow et al. (1961) and found that in the Euro-Area, the services sector reflected high employment elasticities between 1997 and 2001, which contributed to the region's overall employment elasticity. The model by Mourre (2006) included GDP and labour costs as the explanatory variables.

Ajilore and Yinusa (2011) estimated the employment intensity of sectoral output growth in Botswana between 1990 and 2008 using the Okun's Law approach. The main variables used in the study included wage rate, user cost of capital, sectoral gross value added, and measure of external exposure. The study found that employment intensity in banking, commerce, construction, manufacturing and mining were positive but weak, indicating that growth in these sectors was more productivity-driven than labour-employment-driven. This means that increase in growth was because of increased labour-productivity rather than labour-employment, implying that the economy experienced 'jobless-growth'.

In India, Upender (2006) examined output elasticity of employment in the Indian economy with a view to exploring the responsiveness of employment to GDP changes during pre-reform and post-reform period in India. The study used derived demand function from the Production Function theory and fitting double-log linear regression model using annual time series data from 1982-1999. The explanatory variables of the study included GDP and dummy variables to capture pre-reform and post-reform periods in the Indian economy. The study found a positive magnitude of elasticity of employment with respect to output in the finance, insurance and real estate sectors, which was relatively high compared to the negative employment elasticity in the agriculture and hunting sector.

Using production function approach, Mkhize (2019) sought to examine the sectoral employment elasticity in South Africa with focus on the non-agricultural sector. The variables of the study included nominal wages, long-term bond interest rates, inflation as measured by consumer price index (CPI), and gross value added. The results suggested that employment elasticity of output for South Africa is inelastic at 0.45, implying that non-agricultural employment was less responsive to changes in GDP. The mining sector was found to have insignificant elasticity, while the construction sector had high elasticity close to unity. In Zambia, Akinkugbe (2015) explored sectoral employment creating capacity of growth and found that while employment elasticities were positive and significant for most sectors of the economy during the period 1990-2008, the mining, finance, insurance and business services sectors recorded negative elasticities, implying declining propensities to generate employment over the two-decade period by the mining and finance sectors.

From the foregoing brief review of literature, it follows that the relationship between economic growth and employment yields different results. The differences may be attributed to the authors' choice of variables, sectors, countries, and periods. That is, there is no clear direction of the relationship between growth and employment. The present study focuses on the Kenyan economy, looking at nine (9) sectors and the aggregate economy and employing the production function framework to analyze job-creating capacity of economic growth between 1978 and 2017. To the best of our knowledge, there is no study within the Kenyan context that analyses inclusive growth by focusing on employment elasticity of output at sectoral level using the seemingly unrelated regression model to take into account the contemporaneous correlation between the sectors.

3. Methodology and Data

This section presents the methodology of the study. It first presents the estimation methodology followed by description of data.

3.1 Estimating Employment Elasticity

The study examines how inclusive Kenyan economic growth has been by focusing on employment. The study analyzes the responsiveness of employment (in terms of quantity of employed persons) to sectoral outputs. We assess the employment growth that is associated with output growth; i.e. employment elasticity of output growth. The employment elasticity is taken as a proxy measure for employment intensity of growth. However, employment elasticity reflects the inverse of labour productivity. While an elasticity higher than unity implies decline in productivity, a lower than unity elasticity means that employment expansion is taking place along with an increase in productivity. A rise in productivity would lead to a reduction in employment elasticity.

Coulibaly et al. (2019) note that the link between employment elasticity, output growth, and productivity can be a bit more complex. Even though a higher employment elasticity suggests employment-generating growth, such growth is generally associated with a low level of productivity growth. In principle, if the value of employment elasticity is, say x, it follows that a 1 per cent growth in value added is associated with x per cent growth in employment and a productivity increase of (1- x) per cent, *ceteris paribus*. This indicates that a gain in employment elasticity is always obtained at the expense of productivity growth. Kapsos (2006) illustrates how elasticities can be interpreted with respect to both productivity and employment growth as shown in the table below:

Table 3.1: Interpreting employment elasticity with respect to the sign of GDP growth

	GDP Growth	
Employment elasticity	**Positive GDP**	**Negative GDP**
$\beta<0$	(-) employment growth (+) productivity growth	(+) employment growth (-) productivity growth
$0\leq\beta\leq1$	(+) employment growth (+) productivity growth	(-) employment growth (-) productivity growth
$\beta>1$	(+) employment growth (-) productivity growth	(-) employment growth (+) productivity growth

Source: Kapsos (2006)

In responding to the study objective, we estimated aggregate economy and sectoral elasticities. First, the value of the sectoral elasticities will indicate if a particular sector's growth is rather inclusive or not. A positive value indicates that the sector's growth creates jobs. Second, in comparing sector employment elasticity to aggregate economy employment elasticity, we can determine which sector(s) are more inclusive in Kenya. Values that exceed the aggregate economy's elasticity indicate that the sector is more inclusive, and vice versa.

3.2 Econometric Model

The study takes inspiration from the neoclassical theory of production function as espoused in the theoretical section to analyze the responsiveness of employment to changes in output during the 1978-2017 period in Kenya. We adopt the methodology applied by Upender (2006) in India and Mkhize (2019) in South Africa in deriving the labour demand function. Labour demand function is derived from the CES production function by solving the marginal product of labour equation. Taking note that Cobb Douglas production function is appropriate for generating an employment function if coefficient of real output is significantly unity, we adopt the CES production function since it is appropriate in generating an employment function if the regression coefficient of real output is significantly different from unity. Specification of CES production function is given by:

$$GVA_{it} = A\,[\delta K_t^{(-\rho)} + (1 - \delta)\, L_{it}^{(-\rho)}]^{(\eta/(-\rho))} \qquad (3.1)$$

where:

GVA = Gross Value Added (output); K_t = Capital; L_t = Labour (employment);

A = efficiency parameter indicating the state of technology and organizational aspects of production, $A > 0$;

η = returns to scale parameter; $\eta > 0$;

δ = distribution parameter or capital intensity factor concerned with relative factor shares in the total output; $0 < \delta < 1$;

ρ = extent of substitution (between K and L) parameter, $\rho > -1$, and related to the elasticity of substitution; $\sigma = 1/1+ \rho$.

The partial derivative of labour (Marginal Product of Labour (MP_L)) from equation 3.1 is derived as follows:

$$(\partial GVA_{it}) / (\partial L_{it}) = \eta\, (1-\delta)/A^{(\rho/\eta)} \,.\, (GVA_{it}^{((1+\rho)/\eta)})/(L_{it}^{(\rho+1)}) \qquad (3.2)$$

Equation 3.2 represents the MP_L, from the marginal product of labour we solved for labour input variable (L_t) to derive the empirical demand function for employment:

$$\eta(1\text{-}\delta)/A^{(\rho/\eta)} \,.\, GVA_{it}^{((1+\rho)/\eta)} = L_{it}^{(\rho+1)}$$

$$[\eta(1\text{-}\delta)/A^{(\rho/\eta)} \,.GVA_{it}^{((1+\rho)/\eta)}]^{(1/(\rho+1))} = L_{it}$$

$$L_{it} = [\eta(1\text{-}\delta)/A^{(\rho/\eta)}]^{(1/(\rho+1))} \,.\, [GVA_{it}^{((1+\rho)/\eta)}]^{(1/(\rho+1))}$$

$$L_{it} = [\eta(1\text{-}\delta)/A^{(\rho/\eta)}]^{(1/(\rho+1))} \,.\, GVA_{it}^{(1+\rho/\eta \,.\, 1/\rho+1)} \qquad (3.3)$$

Denoting β_o=$[\eta(1\text{-}\delta)/A^{(\rho/\eta)}]^{(1/(\rho+1))}$; and $\beta 1 = 1+\rho/\eta.\ 1/\rho+1$, we know from the assumptions of CES production function that $1/\rho+1=\sigma$ (elasticity of substitution), therefore; $\beta_1 = 1+\rho/\eta \,.\, \sigma$

It follows that;

$$L_{it} = \beta_o \,.\, GVA_{it}^{(\beta_1)} \qquad (3.4)$$

To obtain the linearized employment demand function, equation (3.4) is transformed into logarithm as follows:

$$ln\ L_{it} = ln\ \beta_o + \beta_1\ ln\ GVA_{it}$$

$$ln\ L_{it} = ln\ \beta_o + \beta_1\ ln\ GVA_{it} \qquad (3.5)$$

Equation 3.5 above is the labour demand function of double-log linear specification. The model is linear in B_o and B_1. We know from equation 3.1 that the relationship between output and the two inputs (i.e. labour and capital is nonlinear). However, the relationship is linear in the logarithm form.

Based on reviewed literature and to capture employment elasticities of the main international standard industrial classification (ISIC) division of the Kenyan economy, we extend equation 3.5 by including additional variables such wage rate to capture labour costs, interest rate to capture user cost of capital, imports as a share of value added and as a measure of international exposure and an error term.

To estimate the employment intensity of sectoral output, we estimate the following econometric model:

$$ln\ L_{it} = \beta_o + \beta_1\ ln\ W_{it} + \beta_2\ ln\ R_{it} + \beta_3\ ln\ GVA_{it} + \beta_4\ ln\ M_{it} + \mu_{it} \qquad (3.6)$$

where, $t=1, ..., 40$ indicates the years and $i=1, ..., 9$ represents the nine sectors of employment. The dependent variable, L is the number of employees (total recorded employment), W is the annual average wage rate, R is the user cost of capital proxied by lending interest rate, GVA is the gross value added (output), M is a measure of international exposure and μ_t is the error term. Equation (3.6) above being in logarithmic form allows for interpretation of the β_s as elasticities. For the objective of this study the parameter of interest is β_3.

Seemingly Unrelated Regression

The parameters of equation 3.6 can be estimated separately by OLS for each sector. However, there is potential correlation between the sectors of the economy, and if this is not taken into account, the OLS estimated parameters will not be efficient (Zellner and Theil, 1962; Cadavez and Henningsen, 2012). In our case, since the equations to be estimated for the nine (9) sectors have the number of explanatory variables but not necessarily the same, and that the sectors within the economy are not uniquely independent, we adopt the seemingly unrelated regression (SUR) model. SUR is a system of regression equations that consists of a set of m regression equations, each of which contains different explanatory variables and satisfies the classical assumptions of the standard regression model. SUR estimator was first developed by Zellner (1962) for estimating models with $p>1$ dependent variables that allow for different regressor matrices in each equation, i.e. $X_i \neq X_j$ and account for contemporaneous correlation, i.e. $E(\varepsilon_{it}\ \varepsilon_{jt}) \neq 0$.

The parametric framework of SUR consists of a system of regression equations with m response variables, each containing n observations denoted by $Y' = (y_1, y_2, ..., y_m)$ with corresponding distinct vector of explanatory variables denoted by $X_1, X_2, ..., X_m$. It is assumed that each of the equations in the system satisfies the Gauss-Markov properties of homoscedasticity, and no serial correlations of the error terms. That is:

$$\varepsilon i \sim N(0,\sigma_i^2) \qquad (3.7)$$

$\forall\ i = 1, 2, ..., m$ and that

$$COV\ (\varepsilon_{ni}\varepsilon_{n'_i}) \qquad (3.8)$$

are maintained for $n_i, n'_i = 1, 2, ... n$.

The system is therefore presented as:

$$
\begin{aligned}
y_1 &= X_1 \beta_1 + \varepsilon_1 \\
&\vdots \\
y_m &= X_m \beta_m + \varepsilon_m
\end{aligned}
\qquad (3.9)
$$

Where $i = 1, 2, \ldots, m$, y_i is an $n \times 1$ vector of observations on the i^{th} response variable, X_1 is an $n \times p_i$ matrix of explanatory variables, β_i is a $p_i \times 1$ vector of regression parameters and ε_i is the corresponding $n \times 1$ vector of disturbances. The above system can be written in compact form as:

$$
\begin{bmatrix} y_1 \\ \vdots \\ y_m \end{bmatrix} = \begin{bmatrix} X_1 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & X_m \end{bmatrix} \begin{bmatrix} \beta_1 \\ \vdots \\ \beta_m \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \vdots \\ \varepsilon_m \end{bmatrix} \qquad (3.10)
$$

Equation 3.10 can be re-written as $Y = X\beta + \varepsilon$.

The regression equations presented in (3.9) and (3.10) seem to be independent (seemingly unrelated) from one another, since they do not have common variables or parameters. However, Zellner (1962) concluded that each pair of the system of regression equations above are actually (contemporaneously) correlated through their error terms ε_i, $i = 1, 2, \ldots, m$, an event that may occur when regressing the demand or supply for two related products on some covariates. Estimating each of the equations in (3.9) or (3.10) can be estimated separately by OLS and still yield consistent but inefficient estimates of the regression parameters. Therefore, in SUR estimation techniques, the correlations among the errors in different equations are used to improve the regression estimates.

According to Cadavez and Henningsen (2012), the SUR method estimates the parameters of all equations simultaneously, so that the parameters of each single equation also take the information provided by the other equations into account. This results in greater efficiency of the parameter estimates. This is because additional information is used to describe the system. Judge et al. (1988) notes that efficiency gains of SUR increase with increasing correlation among the error terms of the different equations, while Yahya et al. (2008) opines that larger sample size and higher multi-collinearity between the regressors also improves the efficiency gains of SUR.

Our complete model to estimate the impact of sectoral output growth on employment consists of 9 single equations to be estimated simultaneously. The model is as follows:

$$L_t^{Agr} = \alpha_o + \alpha_1 GVA_t^{Agr} + \alpha_2 W_t^{Agr} + \alpha_3 M_t + \alpha_4 R_t + \varepsilon_1 \tag{3.11}$$

$$L_t^{Min} = \beta_o + \beta_1 GVA_t^{Min} + \beta_2 W_t^{Min} + \beta_3 M_t + \beta_4 R_t + \varepsilon_2 . \tag{3.12}$$

$$L_t^{Man} = \gamma_o + \gamma_1 GVA_t^{Man} + \gamma_2 W_t^{Man} + \gamma_3 M_t + \gamma_4 R_t + \varepsilon_3 \tag{3.13}$$

$$L_t^{Util} = \delta_o + \delta_1 GVA_t^{Util} + \delta_2 W_t^{Util} + \delta_3 M_t + R_t + \varepsilon_4 \tag{3.14}$$

$$L_t^{Con} = \theta_o + \theta_1 GVA_t^{Con} + \theta_2 W_t^{Con} + \theta_3 M_t + \theta_4 R_t + \varepsilon_5 \tag{3.15}$$

$$L_t^{Trad} = \lambda_o + \lambda_1 GVA_t^{Trad} + \lambda_2 W_t^{Trad} + \lambda_3 M_t + \lambda_4 R_t + \varepsilon_6 \tag{3.16}$$

$$L_t^{Tran} = \nu_o + \nu_1 GVA_t^{Tran} + \nu_2 W_t^{Tran} + \nu_3 M_t + \nu_4 R_t + \varepsilon_7 \tag{3.17}$$

$$L_t^{Fin} = \omega_o + \omega_1 GVA_t^{Fin} + \omega_2 W_t^{Fin} + \omega_3 M_t + \omega_4 R_t + \varepsilon_8 \tag{3.18}$$

$$L_t^{Com} = \tau_o + \tau_1 GVA_t^{Com} + \tau_2 W_t^{Com} + \tau_3 M_t + \tau_4 R_t + \varepsilon_9 . \tag{3.19}$$

In this model, α_o, α_1, α_2, α_3, α_4 are the regression coefficients and ε_1 is the error term in the model for labour demand in the agriculture sector (L_t^{Agr}); β_o, β_1, β_2, β_3, β_4 are the regression coefficients and ε_2 is the error term in the model for labour demand in the mining sector (L_t^{Min}); γ_o, γ_1, γ_2, γ_3, γ_4 are the regression coefficient and ε_3 is the error term in the model for labour demand in the manufacturing sector (L_t^{Man}); δ_o, δ_1, δ_2, δ_3, δ_4 are the regression coefficient and ε_4 is the error term in the model for labour demand in the utilities services sector (L_t^{Util}); θ_o, θ_1, θ_2, θ_3, θ_4 are the regression coefficients and ε_5 is the error term for the model of labour demand in construction sector (L_t^{Con}); λ_o, λ_1, λ_2, λ_3, λ_4 are the regression coefficients and ε_6 is the error term in the model for labour demand in the trade sector (L_t^{Trad}); ν_o, ν_1, ν_2, ν_3, ν_4 are the regression coefficients and ε_7 is the error term in the model for labour demand in the transport sector (L_t^{Tran}); ω_o, ω_1, ω_2, ω_3, ω_4 are the regression coefficients and ε_8 is the error term in the model for the financial sector (L_t^{Fin}); τ_o, τ_1, τ_2, τ_3, τ_4 are the regression coefficient and ε_9 is the error term in the model for labour demand in the community and social services sector (L_t^{Com}).

3.3 Data and Variables

For our empirical analysis, we collected data from the Kenya National Bureau of Statistics (KNBS) various issues of Statistical Abstracts and annual Economic Survey Reports. The data is annual, covering 1978 to 2017. The variables used for analysis include total recorded formal employment, gross value added (output), annual average wage earnings as price of labour, lending rate as the price of capital, and a measure of international exposure.

The endogenous variable in our analysis is employment. We measure employment as the total number of wage employees in Kenya's economy and the various economic sectors as per the International Standard Industrial Classification (ISIC). We use wage employment since employment data for self-employed persons and family workers who do not receive regular wages or salaries; informal sector employees and those employed in rural small-scale agriculture and pastoralists activities, is not sufficiently available for all sectors and throughout the sample period of our analysis.

Our main variable of interest is output, both sectoral and aggregate for the economy. This is proxied by gross value added (GVA) at constant 2009 prices. Mkhize (2019) has found a positive relationship between employment and sectoral output growth across all non-agricultural sectors for South Africa's economy. Ajilore and Yinusa (2011) also found a positive employment intensity of output growth in all economic sectors of Botswana save for agriculture, government, transport and electricity gas and water activities.

Our control variables include nominal wage measured as annual average employee earnings by sector in thousand Kenyan shillings. We chose to use nominal wages rather than real wages to avoid potential serial correlation between the estimated variables. The measure of international exposure is total imports divided by value added. Lending rate use to capture the use cost of capital is measured as the annual average interest rate charged on loans and advances by commercial banks as published in the Economic Survey Reports. Table 3.2 describes the variables used in the empirical analysis and specifies the data sources used.

Our analysis involved examining employment intensity of output in the various employment sectors of the economy. This implies that we ran regression equations for each identified sector to determine the nature of relationship between employment and sectoral output.

Classification of economic activities (i.e. industries or sectors of employment) was based on International Standard Industrial Classification for all economic activities (ISIC) as used by KNBS. In this framework, KNBS identifies 17 economic activities (or sectors of employment) within the Kenyan economic context. These are: agriculture, forestry, and fishing; mining and quarrying; electricity gas and water supply; construction; wholesale and retail trade, transportation and storage; accommodation and food services, information and communication; financial and insurance activities; real estate; professional, scientific, and technical activities; administrative and support service activities; public administration and defence; education; health and social work; and other service activities.

Table 3.2: Description of the variables.

Variable	Source	Definition & Measurement
Employment (L_t)	Statistical Abstract (various), KNBS	Total number of workers employed in wage/formal employment in various sectors of employment in the economy. This is measured in numbers.
Wage Rate (W_t)	Statistical Abstract (various), KNBS	Annual average nominal earnings received by employees in cash, including basic salary, cost of living allowances, profit bonus, together with the value of rations and free board, and an estimate of the employer's contribution towards housing. Measured in thousand Kenya shilling.
Lending Rate (R_t)	Economic Survey (various), KNBS	The annual weighted average nominal interest rate charged by commercial banks on loans and advances. Measured in per cent (%).
Gross Value Added (GVA_t)	Statistical Abstract (various), KNBS	Gross value added at basic prices, calculated as output at basic prices less intermediate consumption at purchasers' prices. It is used as a proxy for economic output and is measured in millions Kenya shillings.
Measure of international exposure (M_t)	Statistical Abstract (various), KNBS	Share of imports over value added (%)

Note: This table presents the variables used in the paper, their definitions and/or measurement, and the sources of raw data

For the purposes of this study, we collapsed the 17 economic activities into nine (9) major sectors of employment as per Table 3.3. This is done due to the longer time series; the earlier available data aggregated the sectors. Therefore, we aggregated agriculture, forestry, fishing and livestock activities into Agriculture, mining and quarrying activities into Mining; manufacturing activities into Manufacturing, electricity, gas and water supply activities into Utilities; building and construction activities into Construction; wholesale and retail trade, hotels, accommodation and restaurant services collapsed into Trade and Hospitality; transport, storage, information and communications services into Transport; financial, insurance, real estate, professional services and other business services collapsed into Finance and Business; while public administration and defence, education, health and social work collapsed into Community and Social services.

Table 3.3: Sector aggregation

Industry/Sector	Name Aggregate
Agriculture, Forestry, Fishing, Livestock	Agriculture
Mining, Quarrying	Mining
Manufacturing	Manufacturing
Electricity, Gas, Water	Utilities
Building and Construction	Construction
Wholesale trade, Retail trade, Accommodation, and restaurant	Trade and Hospitality
Transport and Storage, Information and Communication	Transport
Financial and Insurance Services, Real Estate, Professional Administration and Support Services, Other Business Services	Finance and Business
Public Administration and Defence, Education, Health and Social Work	Community and Social
Aggregate economy	ALL

Note: This table presents the various aggregated sectors and the name aggregate for the study purposes

3.4 Estimation Techniques

Granger and Newbold (1974) suggest that the first step in estimating a time series model is establishing the nature of integration of the variables to be estimated. They show that regression of two or more non-stationary time series could lead to a spurious or nonsense result, implying that one could find a statistically significant relationship whereas *a priori* there should be none. It is therefore necessary to test for the stationarity or the order of integration before any regression analysis is conducted. Gujarati (2008: 798) defines a stochastic process as stationary if its mean, variance and autocovariance at various lags remains constant over time. In other words, a non-stationary time series will have a time-varying mean or a time-varying variance or both. This process involves examining existence of unit roots in the series. In this study, we tested for the order of integration of variables making the aggregate and sectoral labour demand function in equation 3.6. The augmented Dickey-Fuller (ADF) was used to investigate the order of integration of the model series.

The next step involved establishing presence of contemporaneous or cross-sectional relation. In the absence of contemporaneous correlation between errors in different equations, the OLS equation-by-equation is entirely efficient. However, Zellner (1962) shows that when the error terms are correlated across the equations, the equations are related and joint estimation, rather than equation-by-equation estimation, leads to more precise estimates of the regression coefficients. The study therefore conducted the Breusch-Pagan test of independence of the separate OLS equations.

4. Results and Discussion

4.1 Descriptive Analysis

The study conducted descriptive analysis to establish the statistical properties of the data and ensure that the estimable model had an appropriate functional and mathematical form. Table 4.1 below gives the mean, standard deviation, skewness, kurtosis, Jarque-Bera statistics and the probabilities of all the variables used in the aggregate economy model. Similar procedures were followed for variables used in the other 9 sectoral models as presented in Appendix Table A2.

Table 4.1: Descriptive statistics (aggregate economy model)

	ln_labour	ln_imports	ln_gva	ln_interest	ln_wages
Mean	14.2759	3.1668	27.2302	2.8452	11.4738
Median	14.3260	3.1372	27.5213	2.7081	11.6885
Maximum	14.7925	3.6591	29.6416	4.2767	13.4359
Minimum	13.7228	2.8083	24.7365	2.3026	9.2681
Std. Dev.	0.2808	0.2243	1.4605	0.3994	1.3708
Skewness	- 0.1707	0.3590	- 0.1286	1.4109	- 0.1184
Kurtosis	2.2802	2.2421	1.8315	5.4984	1.5072
Jarque-Bera	1.0578	1.8166	2.3860	23.6740	3.8075
Probability	0.5892	0.4032	0.3033	0.0000	0.1490
Observations	40	40	40	40	40

Results for mean, median, maximum, and minimum reveal that there are no serious outliers in our data. It is evident that the natural logarithms of all the variables are not dispersed significantly from their mean values as indicated by their relatively small standard deviation values. The Jarque-Bera test statistics, which tests whether a series has a normal distribution by measuring the difference of the series skewness and kurtosis with those of a normal distribution, was used to test the null hypothesis that the distribution of the variables is not significantly different from normal. The Jarque-Bera statistic explicitly rejected the null hypothesis of normal distribution for interest rate-cost of capital. However, the null hypothesis of normal distribution was accepted for the rest of the variables at the 1%, 5% and 10% levels of significance. Similar results are true for the 9 sectoral models, save for construction and utilities sector models where both the labour and interest rate variables are explicitly not normally distributed (Appendix Table A2).

4.2 Pre-estimation Tests

The basic assumption of classical linear regression model is that variables have a constant mean, variance, and the covariance between the values of two time periods equals zero. When this assumption is violated, the regression results are said to be spurious or nonsensical. To avoid this pitfall, we conducted unit root test on all the variables for the aggregate economy and the nine sectors to ascertain whether they are stationarity or non-stationary.

The Augmented Dickey-Fuller (ADF) test was used. ADF test was preferred since it maintains the reliability of tests by making sure that errors are indeed white noise. ADF test was conducted with constant/intercept and with intercept and trend. The lag length selection of the ADF test was based on the Schwartz-Bayesian Information Criterion (SBIC). We preferred the SBIC because it penalizes more compared to other criteria such as Akaike Information Criterion (AIC). The null hypothesis in the ADF test is that there is presence of unit root, meaning the variable(s) are non-stationary. The decision-making rule of thumb is that if the calculated p-values are greater than critical p-values at 5 per cent level of significance, the null hypothesis is not rejected, and the series is concluded to be non-stationary. However, if calculated p-values are less than critical p-values at 5 per cent level of significance, then the null hypothesis of the presence of unit root was rejected and the series is concluded to be stationary. The ADF test results for the aggregate economy model are as shown in the Table 4.2 below while those for sectoral model are presented in Appendix Table A3 in the appendices.

Table 4.2: ADF Test results for the aggregate economy model

Variable	ADF Test (Level)		ADF Test (1st difference)		Decision
	P-value (Intercept)	P-value (Trend and intercept)	P-value (Intercept)	P-value (Trend and intercept)	
1. Aggregate Economy					
ln_labour	0.8945	0.4577	0.0000	0.0000	I (1)
ln_imports	0.3996	0.3304	0.0000	0.0000	I (1)
ln_gva	0.8483	0.6482	0.0063	0.0285	I (1)
ln_interest	0.2277	0.5680	0.0000	0.0000	I (1)
ln_wages	0.7475	0.9672	0.0000	0.0002	I (1)

The test results show that the model variables had unit roots at level, but upon differencing the variables were integrated of order one, i.e. I (1). This is true for variables in the aggregate economy model and variables in the nine sectoral models as presented in the appendices section.

Subsequently, the study conducted the Breusch-Pagan test of independence of the separate OLS equations. The cross-correlation matrix presented in Appendix Table A4 shows considerable correlation coefficients of the residuals among the equations across the sectors, which indicates that the SUR estimation method is more appropriate than the OLS equation-by-equation procedure.

Econometric results of employment elasticity of output

Table 4.4 shows the regression results for the aggregate economy estimated using OLS. At the aggregate economy level, employment elasticity of output was 0.24, which is statistically significant at 1 per cent level. This indicates that all else constant, one per cent growth in gross value added for the economy leads to increase in employment by 0.24 per cent. This employment elasticity is inelastic, since a one per cent increase in output leads to less than proportionate increase in employment. Moreover, the estimated elasticity is low compared to the 0.7 recommended by Khan (2001). Based on Kapsos (2006), this implies that Kenya's growth is not inclusive and is mainly driven by productivity growth. These findings are in tandem with those found by Turyareeba et al. (2020) in Uganda, Ajakaiye et al. (2015) in Nigeria, and Kamgnia (2009) panel approach for African economies.

Table 4.4: OLS regression results for aggregate economy

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Intercept	0.0232	0.0101	2.2876	0.0287
Gross Value Added	0.2417	0.0361	6.7019	0.0000
Wages (user cost of labour)	-0.0982	0.0504	-1.9471	0.0601
Interest rate (user cost of capital)	0.0249	0.0093	2.6904	0.0111
Measure of international exposure)	-0.0182	0.0228	-0.7994	0.4298
R-squared	0.7388			
F-statistic	18.6696			
Prob(F-statistic)	0.0000			
Observations	39			

Source: Author estimation using STATA.

Table 4.5 presents the seemingly unrelated regression results. The agriculture sector reveals a negative and statistically significant employment elasticity of output (-0.04). This means that increase in agricultural output will lead to a decline in agricultural employment. This is in line with Chenery and Syrquin (1975) structural change theory. Essentially, in a country with positive economic growth, a negative employment elasticity corresponds with negative employment growth and positive productivity growth (Kapsos, 2006). Even though agriculture has been known as a labour-intensive sector, the negative employment growth in Kenya's agriculture sector results partly from increased mechanization and investment in labour-saving technologies within the sector, particularly in the 2000s. Comparing the agriculture sector elasticity against the aggregate economy, we conclude that the agriculture sector is less inclusive in terms of job creation. The negative elasticity is partly resulting from the use of labour-saving technologies in the sector, indicating that this sector will not be able to create enough jobs for the growing rural labour force in future. These results are consistent with Ajilore and Yinusa (2011). Negative elasticity is also recorded in the Utilities sector (-0.03), even though the results are not statistically significant.

The results for the remaining sectors of the economy (mining, manufacturing, construction, trade and hospitality, transport, finance and business, and community and social services) reveal that the sign of the coefficient on sectoral gross value added is positive and conforms to the theoretical expectation. These results are also statistically significant at 1 and 5 per cent levels. This implies that during the period covered by this study, growth in gross value added by these sectors contributed to significant employment generation. Most notable are the trade sector (0.38), community and social services (0.31), finance and businesses services (0.28), construction sector (0.22), transport sector (0.19), manufacturing (0.17) and mining (0.12). Following the Kapsos (2006) framework for interpretation, these results indicate that output growth in these sectors are job-creating and productivity in these sectors is also positive. Based on the magnitude of the elasticities, Trade sector - which in this study is the name aggregate for wholesale trade, retail trade, accommodation and restaurant sectors – has the highest employment intensity, which is also above the aggregate economy elasticity, implying that it is more inclusive than the other sectors. Community and social services (comprising of public administration and defense, education, health, and social work) and finance and business services (financial and insurance services, real estate, professional and administrative service) also have elasticities higher than that of the aggregate economy, implying that they are more inclusive compared to the other sectors of the economy. Mining, manufacturing, transport, and construction sectors have positive elasticities albeit below the aggregate economy. These sectors have positive elasticities and thus potential job-creating capacities. Even though these results show low elasticities, they conform to the workforce transformation model that posits that as a country gradually enters the upper-middle income status and becomes more developed, the workforce shifts to high productive sectors. Similar sentiments are expressed in Kahn (2001).

Table 4.5: Seemingly unrelated regression results for employment elasticity of sectoral output in Kenya (1978-2017)

Sector	Explanatory Variable	Coef.	Std. Err.	z	P>z
Agriculture	Gross value Added	-0.0437	0.0151	-2.8900	0.0040
	Wages (user cost of labour)	-0.1215	0.0129	-9.4000	0.0000
	Measure of international exposure	-0.0182	0.0258	-0.7000	0.4810
	Interest rate (user cost of capital)	0.0085	0.0454	0.1900	0.8510
	Intercept	11.9492	0.1066	112.1100	0.0000
Mining	Gross value Added	0.1224	0.0457	2.6800	0.0070
	Wages (user cost of labour)	0.2138	0.0418	5.1100	0.0000
	Measure of international exposure	-0.3436	0.1114	-3.0800	0.0020
	Interest rate (user cost of capital)	-0.0335	0.0110	-3.0500	0.0020
	Intercept	7.3391	0.3137	23.3900	0.0000
Manufacturing	Gross value added	0.1664	0.0254	6.5400	0.0000
	Wages (user cost of labour)	-0.0130	0.0246	-0.5300	0.5980
	Measure of international exposure	-0.0608	0.0244	-2.4900	0.0130
	Interest rate (user cost of capital)	-0.0474	0.0124	-3.8145	0.0032
	Intercept	10.4174	0.0681	153.0600	0.0000
Utilities	Gross value Added	-0.0352	0.0333	-1.0600	0.2890
	Wages (user cost of labour)	0.2190	0.0270	8.1100	0.0000
	Measure of international exposure	-0.7999	0.0762	-10.5000	0.0000
	Interest rate (user cost of capital)	0.0329	0.0476	0.6900	0.4890
	Intercept	10.4940	0.2308	45.4600	0.0000
Construction	Gross value added	0.2150	0.0635	3.3900	0.0010
	Wages (user cost of labour)	-0.0179	0.0593	-0.3000	0.7630
	Measure of international exposure	-0.0942	0.1142	-0.8200	0.4100
	Interest rate (user cost of capital)	-0.1894	0.0331	-5.7200	0.0000
	Intercept	9.6215	0.3535	27.2100	0.0000
Trade	Gross value Added	0.3761	0.0390	9.6400	0.0000
	Wages (user cost of labour)	-0.0983	0.0384	-2.5600	0.0110
	Measure of international exposure	0.1631	0.0711	2.2900	0.0220
	Interest rate (user cost of capital)	-0.0505	0.0302	-1.6700	0.0940
	Intercept	9.4578	0.1962	48.2100	0.0000
Transport	Gross value added	0.1868	0.0766	2.4400	0.0015
	Wages (user cost of labour)	-0.1470	0.0565	-2.6000	0.0090
	Measure of international exposure	0.0407	0.1056	0.3900	0.7000
	Interest rate (user cost of capital)	-0.1024	0.0208	-4.9100	0.0000
	Intercept	9.0924	0.3214	28.2900	0.0000
Finance	Gross value added	0.2829	0.0396	7.1400	0.0000
	Wages (user cost of labour)	-0.0104	0.0356	-0.2900	0.7690

	Measure of international exposure	0.1377	0.0548	2.5100	0.0120
	Interest rate (user cost of capital)	0.0073	0.0310	0.2400	0.8130
	Intercept	8.5050	0.1695	50.1900	0.0000
Community	Gross value added	0.3091	0.0493	6.2700	0.0000
	Wages (user cost of labour)	-0.0818	0.0436	-1.8800	0.0610
	Measure of international exposure	-0.3110	0.0445	-6.9900	0.0000
	Interest rate (user cost of capital)	0.1024	0.0208	4.9100	0.0000
	Intercept	-0.0534	0.0472	-1.1300	0.2580

Source: Estimation results using STATA

The foregoing results also show that cost of labour significantly influences labour demand. At the aggregate economy, 10 per cent increase in cost of labour in terms of wages results into a decline in employment by about 0.9 per cent. These results are significant at 5 per cent level. Similar results are mirrored in agriculture, manufacturing, construction, trade and hospitality, transport, finance and business services, and community and social services, sectors where an increase in cost of labour will be accompanied by a decline in demand for labour. That is, higher wages put pressure on labour costs, which in turn impel firms to reduce quantities demanded for labour. These results are consistent with those found by Mkhize (2019) and Ajilore and Yinusa (2011).

International exposure of the economy negatively and significantly affects employment at the aggregate economy level and across most of the sectors, save for trade and hospitality services, transport and finance and business sectors. These results indicate that the more open the Kenyan economy becomes, the less the employment creation capacity does the sectors exhibit. For instance, increased openness of the economy, which is measured by the ratio of imports to output, will lead to employment reduction in agriculture, mining, manufacturing, utilities, and community and social services sectors, respectively. We can therefore conclude that increased imports share of output is detrimental to employment generation strategies for the sectors. These findings are consistent with Kamgnia (2009), who finds that the degree of openness significantly but negatively explains the variations of the workforce in Africa. This is because most African economies, Kenya included, rely heavily on imports and are vulnerable to swing in fuel prices in the international market, which adversely affects trade balances, translating to the negative effects of openness. Similar findings are reported by Ajilore and Yinusa (2011) in Botswana.

Regarding the coefficient for user cost of capital variable, the degree and sign of employment elasticity varies from one sector to the other, in line with model assumptions. For transport, trade and hospitality, construction, mining, and manufacturing, the user cost of capital coefficient is negative and significant, suggesting a negative relationship between employment and interest rate. This implies that these capital-intensive sectors, and increase in interest rate decreased the demand to capital, which in turn reduces the derived demand for labour. In Kamgnia (2009), private sector credit has been used as a proxy for access to capital. The study finds that the easier it is to access capital, the higher the capacity for employment creation.

Appendix Table A6 shows the results for Wald test of equality of regression, commonly referred to as test for coefficient restriction. The results show that the hypothesis that regression coefficients on gross value added for each sectoral equation (i.e. GVA_t^{Agr}, GVA_t^{Min}, GVA_t^{Man} GVA_t^{Util}, GVA_t^{Con}, GVA_t^{Trad}, GVA_t^{Tran}, GVA_t^{Fin}, *and* GVA_t^{Com}) are equal is rejected, implying that the different sectoral outputs impact on sectoral employment differently.

5. Conclusions and Recommendations

This paper sought to find out whether Kenya's economic growth has been inclusive by examining the role of output growth in employment creation. We examined the labour elasticity of output by estimating labour demand equations for Kenya based on neoclassical theory of production function. Specifically, the study sought to establish the employment elasticity of sectoral output. At aggregate economy level, OLS regression was employed while at the sectoral level, Seemingly Unrelated Regression (SUR) was implemented. We used data from the Kenya National Bureau of Statistics (KNBS) for the period 1978-2017. SUR model consisting of nine (9) single equations (one for each sector) was estimated using SUR estimator and STATA 16 software package. The study provides evidence that sectoral output positively influences employment in all the sectors, save for agriculture and utilities sector.

Khan (2001) estimates that an elasticity of 0.7 is ideal and is compatible with a satisfactory level of productivity growth. Our results suggest that overall, the economy exhibits low labour absorptive capacity both at the aggregate and sectoral level. This implies that the observed growth over the years has been driven mainly by labour productivity improvements rather than increased employment. Inference can, therefore, be made that after all, expansion of the Kenyan economy has not necessarily been able to employ all those who seek work to support their families. Nonetheless, four sectors show potential for high labour absorptive capacity. These most inclusive and thus job creating sectors are trade and hospitality sector, followed by community and social services sector then finance and business services sector, construction sector and transport sector. If well harnessed, these sectors could drive inclusive growth agenda of the country.

From a policy perspective, the study notes that even though agriculture is the mainstay of the Kenyan economy, the sector is losing its labour intensiveness through structural change as exhibited by the negative elasticity, while its productivity is increasing due to application of labour-saving technologies in the sector. In the long run, the sector may not create enough jobs for the rural population. To this end, the Ministry of Agriculture, Livestock and Fisheries should faithfully implement its 10-year Agricultural Sector Growth and Transformation Strategy (ASGTS), giving special focus to increased labour productivity per worker through extension capacity building services and productivity per hectare (yields) through leasing of improved farming technologies and extension of fertilizer subsidies programme, and shifting as many workers as possible out of farm level agriculture into large and small scale value addition activities. Establishing a skills programme for youth and women to expose them to the various value addition agro-processing activities will be a plus. This will not only enhance output but will also result into increased food supply and enhanced nutrition for Kenyans as captured in MTP III. Agro-processing will also be a welcome move for the growing manufacturing sector. Imparting appropriate skills to those involved in the agriculture sector to shift to non-farm employment will significantly aid in reduction of poverty in rural areas.

Noting the importance of services and industry in creating employment in the economy, as espoused in our result, more investments should be channelled to support trade, finance and businesses, construction and transport sectors, which are mainly dominate by private entities particularly Small and Medium Businesses (SMEs). As the services sector is proving to command a huge share of GDP in Kenya, it is also evident from our results that this sector has a huge capacity for employment generation. Diversification towards this direction, particularly in Small and Medium Businesses (SMEs) in business services, insurance, real estate, transport communication and financial services is a pragmatic move. These sectors can be supported in terms of regulatory measures, pricing of services, inputs, and outputs and favourable taxation measures that support sector-growth.

Overall, as the Governments continues with its agenda for employment and wealth creation, there is need for all sectors of the economy to press with sectoral restructuring and transformation efforts not only to set them up to better deliver the objectives of the Kenya Vision 2030, but to help move the country to a more inclusive society, providing a high quality of life to all.

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Appendices

Appendix A1: Actual and targeted growth and employment levels (2008-2017)

Indicator	2008		2009		2010		2011		2012	
	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target
Real GDP (%)	2.1	**6.2**	4.2	**8.3**	5.1	**9.1**	4.1	**9.7**	4.5	**10.0**
Form. Emp.'000	-4.3	-	53.5	-	59.5	-	71.9	-	74.8	-
Infor. Emp.'000	537.9	-	637.1	-	694.5	-	587.2	-	570.2	-
Emp. Growth (%)	5.0	**4.7**	4.5	**8.4**	10.2	**8.7**	5.8	**9.1**	5.3	**10.0**
	2013		**2014**		**2015**		**2016**		**2017**	
	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target
Real GDP (%)	5.7	**6.7**	5.3	**7.8**	5.6	**8.7**	5.9	**9.6**	4.9	**10.6**
Form. Emp.'000	134.2	**108**	106.3	**164**	128	**250**	84.8	**418**	110	**573**
Infor. Emp.'000	621.6	**615**	695.9	**657**	716.4	**750**	747.3	**776**	787.8	**859**
Emp. Growth (%)	5.9	**10**	5.9	**13.6**	5.9	**21.8**	5.5	**19.4**	5.6	**19.9**

Appendix A2: Descriptive statistics

1. Agriculture					
	ln_labour	**ln_imports**	**ln_gva**	**ln_interest**	**ln_wages**
Mean	12.5807	3.1668	26.3106	2.8452	10.6134
Median	12.6360	3.1372	26.6358	2.7081	10.8302
Maximum	12.7440	3.6591	28.6736	4.2767	12.6711
Minimum	12.3188	2.8083	24.2103	2.3026	8.4170
Std. Dev.	0.1373	0.2243	1.2510	0.3994	1.4219
Skewness	-0.4610	0.3590	-0.0732	1.4109	-0.1304
Kurtosis	1.7491	2.2421	2.0244	5.4984	1.5073
Jarque-Bera	4.0245	1.8166	1.6222	23.6740	3.8267
Probability	0.1337	0.4032	0.4444	0.0000	0.1476
Observations	40	40	40	40	40
2. Mining					
	ln_labour	**ln_imports**	**ln_gva**	**ln_interest**	**ln_wages**
Mean	8.5835	3.1668	22.2738	2.8452	19.7719
Median	8.5184	3.1372	21.9923	2.7081	19.7106
Maximum	9.6288	3.6591	24.8395	4.2767	22.6788
Minimum	7.6672	2.8083	19.9363	2.3026	17.1377

Std. Dev.	0.4931	0.2243	1.5459	0.3994	1.5985
Skewness	0.4441	0.3590	0.1497	1.4109	0.1359
Kurtosis	2.8000	2.2421	1.8259	5.4984	1.9186
Jarque-Bera	1.3818	1.8166	2.4471	23.6740	2.0724
Probability	0.5011	0.4032	0.2942	0.0000	0.3548
Observations	40	40	40	40	40
3. Manufacturing					
	ln_labour	**ln_imports**	**ln_gva**	**ln_interest**	**ln_wages**
Mean	12.2499	3.1668	25.1387	2.8452	11.3810
Median	12.2803	3.1372	25.3249	2.7081	11.6672
Maximum	12.6227	3.6591	27.2084	4.2767	13.1128
Minimum	11.7757	2.8083	22.7071	2.3026	9.4200
Std. Dev.	0.2457	0.2243	1.4057	0.3994	1.1669
Skewness	-0.2510	0.3590	-0.1346	1.4109	-0.2032
Kurtosis	1.9045	2.2421	1.7277	5.4984	1.6053
Jarque-Bera	2.4203	1.8166	2.8186	23.6740	3.5172
Probability	0.2982	0.4032	0.2443	0.0000	0.1723
Observations	40	40	40	40	40
4. Utilities					
	ln_labour	**ln_imports**	**ln_gva**	**ln_interest**	**ln_wages**
Mean	9.8911	3.1668	23.4748	2.8452	11.8296
Median	9.9519	3.1372	23.6259	2.7081	11.8649
Maximum	10.4192	3.6591	26.0301	4.2767	13.8458
Minimum	9.1367	2.8083	21.0622	2.3026	9.3894
Std. Dev.	0.2802	0.2243	1.3799	0.3994	1.4499
Skewness	-1.2436	0.3590	0.0589	1.4109	-0.1149
Kurtosis	4.6393	2.2421	1.9556	5.4984	1.6183
Jarque-Bera	14.7893	1.8166	1.8412	23.6740	3.2696
Probability	0.0006	0.4032	0.3983	0.0000	0.1950
Observations	40	40	40	40	40
5. Construction					
	ln_labour	**ln_imports**	**ln_gva**	**ln_interest**	**ln_wages**
Mean	11.2873	3.1668	24.1242	2.8452	11.3819
Median	11.2474	3.1372	24.1115	2.7081	11.5539
Maximum	12.0312	3.6591	26.8402	4.2767	13.3957
Minimum	10.8047	2.8083	21.5886	2.3026	9.3010
Std. Dev.	0.2992	0.2243	1.5020	0.3994	1.4103
Skewness	1.0085	0.3590	0.0274	1.4109	-0.0708
Kurtosis	3.4520	2.2421	1.9250	5.4984	1.4604

Jarque-Bera	7.1205	1.8166	1.9310	23.6740	3.9838
Probability	0.0284	0.4032	0.3808	0.0000	0.1364
Observations	40	40	40	40	40
6. Trade & Hospitality					
	ln_labour	**ln_imports**	**ln_gva**	**ln_interest**	**ln_wages**
Mean	11.8830	3.1668	24.5800	2.8452	11.7364
Median	11.9146	3.1372	25.0542	2.7081	12.0113
Maximum	12.7085	3.6591	27.2093	4.2767	13.3423
Minimum	11.0418	2.8083	21.7078	2.3026	9.6194
Std. Dev.	0.4699	0.2243	1.7527	0.3994	1.2492
Skewness	0.0607	0.3590	-0.1596	1.4109	-0.2619
Kurtosis	2.0730	2.2421	1.6511	5.4984	1.4830
Jarque-Bera	1.4568	1.8166	3.2022	23.6740	4.2927
Probability	0.4827	0.4032	0.2017	0.0000	0.1169
Observations	40	40	40	40	40
7. Transport					
	ln_labour	**ln_imports**	**ln_gva**	**ln_interest**	**ln_wages**
Mean	11.4253	3.1668	24.7872	2.8452	11.9345
Median	11.3437	3.1372	25.0591	2.7081	12.0061
Maximum	12.2309	3.6591	27.2989	4.2767	13.9304
Minimum	10.8385	2.8083	22.0105	2.3026	9.7162
Std. Dev.	0.4184	0.2243	1.6123	0.3994	1.4061
Skewness	0.4408	0.3590	-0.1701	1.4109	-0.0585
Kurtosis	2.0045	2.2421	1.8240	5.4984	1.4733
Jarque-Bera	2.9469	1.8166	2.4979	23.6740	3.9073
Probability	0.2291	0.4032	0.2868	0.0000	0.1418
Observations	40	40	40	40	40
8. Finance and Business					
	ln_labour	**ln_imports**	**ln_gva**	**ln_interest**	**ln_wages**
Mean	11.2535	3.1668	11.0109	2.8452	12.2361
Median	11.3278	3.1372	11.1900	2.7081	12.3408
Maximum	11.9366	3.6591	12.0571	4.2767	14.1302
Minimum	10.3739	2.8083	9.7858	2.3026	10.0854
Std. Dev.	0.4080	0.2243	0.6753	0.3994	1.3428
Skewness	-0.2456	0.3590	-0.2368	1.4109	-0.0924
Kurtosis	2.4333	2.2421	1.9071	5.4984	1.4926
Jarque-Bera	0.9375	1.8166	2.3647	23.6740	3.8439
Probability	0.6258	0.4032	0.3066	0.0000	0.1463
Observations	40	40	40	40	40

9. Public & Social					
	ln_labour	**ln_imports**	**ln_gva**	**ln_interest**	**ln_wages**
Mean	13.3931	3.1668	25.3640	2.8452	11.4671
Median	13.4882	3.1372	25.6032	2.7081	11.7206
Maximum	13.9255	3.6591	27.5316	4.2767	13.4376
Minimum	12.6942	2.8083	22.7335	2.3026	9.3255
Std. Dev.	0.2937	0.2243	1.4741	0.3994	1.3806
Skewness	-0.5861	0.3590	-0.2204	1.4109	-0.0837
Kurtosis	2.8789	2.2421	1.8029	5.4984	1.4676
Jarque-Bera	2.3144	1.8166	2.7122	23.6740	3.9603
Probability	0.3144	0.4032	0.2577	0.0000	0.1380
Sum Sq. Dev.	3.3649	1.9622	84.7401	6.2221	74.3350
Observations	40	40	40	40	40

This table reports the descriptive statistics of the data used in the estimation to determine the distributional characteristics of the data. Each panel provides the descriptive statistics of each of the nine sectors.

Appendix A3: Unit root test results

Variable	**ADF Test (Level)**		**ADF Test (1st difference)**		**Decision**
	P-value (Intercept)	P-value (Trend & intercept)	P-value (Intercept)	P-value (Trend and intercept)	
1. Aggregate Economy					
ln_labour	0.8945	0.4577	0.0000	0.0000	I (1)
ln_imports	0.3996	0.3304	0.0000	0.0000	I (1)
ln_gva	0.8483	0.6482	0.0063	0.0285	I (1)
ln_interest	0.2277	0.5680	0.0000	0.0000	I (1)
ln_wages	0.7475	0.9672	0.0000	0.0002	I (1)
2. Agriculture					
ln_labour	0.7712	0.8389	0.0000	0.0000	I (1)
ln_imports	0.3996	0.3304	0.0000	0.0000	I (1)
ln_gva	0.9916	0.3175	0.0005	0.0032	I (1)
ln_interest	0.2277	0.5680	0.0000	0.0000	I (1)
ln_wages	0.8281	0.8984	0.0132	0.0023	I (1)
3. Mining					
ln_labour	0.9781	0.7877	0.0003	0.0018	I (1)
ln_imports	0.3996	0.3304	0.0000	0.0000	I (1)
ln_gva	0.9666	0.1587	0.0000	0.0000	I (1)
ln_interest	0.2277	0.5680	0.0000	0.0000	I (1)
ln_wages	0.9778	0.2397	0.0002	0.0014	I (1)

4. Manufacturing					
ln_labour	0.0035	0.4615	0.0001	0.0004	I (1)
ln_imports	0.3996	0.3304	0.0000	0.0000	I (1)
ln_gva	0.3902	0.9455	0.0000	0.0000	I (1)
ln_interest	0.2277	0.5680	0.0000	0.0000	I (1)
ln_wages	0.7043	0.9493	0.0009	0.0039	I (1)
5. Utilities					
ln_labour	0.3043	0.9278	0.0080	0.0401	I (1)
ln_imports	0.3996	0.3304	0.0000	0.0000	I (1)
ln_gva	0.9633	0.4428	0.0000	0.0002	I (1)
ln_interest	0.2277	0.5680	0.0000	0.0000	I (1)
ln_wages	0.6095	0.8944	0.0000	0.0000	I (1)
6. Construction					
ln_labour	0.9999	0.9920	0.0000	0.0000	I (1)
ln_imports	0.3996	0.3304	0.0000	0.0000	I (1)
ln_gva	0.9710	0.5055	0.0000	0.0001	I (1)
ln_interest	0.2277	0.5680	0.0000	0.0000	I (1)
ln_wages	0.8706	0.9142	0.0005	0.0030	I (1)
7. Trade and Hospitality					
ln_labour	0.9784	0.7948	0.0003	0.0022	I (1)
ln_imports	0.3996	0.3304	0.0000	0.0000	I (1)
ln_gva	0.8063	0.7654	0.0076	0.0315	I (1)
ln_interest	0.2277	0.5680	0.0000	0.0000	I (1)
ln_wages	0.4732	0.9828	0.0008	0.0027	I (1)
8. Transport					
ln_labour	0.9935	0.5818	0.0011	0.0031	I (1)
ln_imports	0.3996	0.3304	0.0000	0.0000	I (1)
ln_gva	0.5490	0.9299	0.0416	0.0000	I (1)
ln_interest	0.2277	0.5680	0.0000	0.0000	I (1)
ln_wages	0.7553	0.9830	0.0038	0.0182	I (1)
9. Finance and Business					
ln_labour	0.6187	0.5034	0.0003	0.0013	I (1)
ln_imports	0.3996	0.3304	0.0000	0.0000	I (1)
ln_gva	0.5282	0.4054	0.0000	0.0000	I (1)
ln_interest	0.2277	0.5680	0.0000	0.0000	I (1)
ln_wages	0.8203	0.1500	0.0000	0.0000	I (1)

10. Public and Social					
ln_labour	0.3373	0.1854	0.0000	0.0000	I (1)
ln_imports	0.3996	0.3304	0.0000	0.0000	I (1)
ln_gva	0.0097	0.9955	0.0035	0.0008	I (1)
ln_interest	0.2277	0.5680	0.0000	0.0000	I (1)
ln_wages	0.8454	0.9135	0.0000	0.0000	I (1)

This table reports the ADF test results for the aggregate economy and the nine sector models. The significance level of critical values is measured at 5 per cent.

Appendix A4: Correlation matrix of residuals

	Agriculture	Mining	Manufacturing	Utilities	Construction	Trade	Transport	Finance	Community
Agriculture	1.0000								
Mining	0.0906	1.0000							
Manufacturing	0.2532	-0.0408	1.0000						
Utilities	-0.2345	0.3155	-0.0853	1.0000					
Construction	0.1287	-0.0402	0.0374	0.2076	1.0000				
Trade	0.3753	0.2393	0.1593	0.2121	0.3810	1.0000			
Transport	0.3988	-0.1164	0.2217	-0.0082	0.4281	0.4054	1.0000		
Finance	-0.0324	0.1037	-0.0783	0.4696	0.2735	0.5255	0.2076	1.0000	
Community	-0.1417	0.0805	0.1296	0.3731	0.3340	0.0626	0.1134	0.3146	1.0000

Breusch-Pagan test of independence: chi2(36) = 90.633, Pr = 0.0000

Appendix A5: SUR statistical tests for the 9 sectors

	Agriculture	Mining	Manufacturing	Utilities	Construction	Trade	Transport	Finance	Community
R-squared	0.97	0.95	0.96	0.91	0.85	0.97	0.94	0.98	0.97
F-statistic	1116.90	733.41	3906.84	453.77	238.14	1676.70	652.79	1957.41	1536.48
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	39	39	39	39	39	39	39	39	39

Appendix A6: Results of the test of equality of regression coefficients test

$GVA_t^{Agr} = GVA_t^{Min} = GVA_t^{Man} = GVA_t^{Util} = GVA_t^{Con} = GVA_t^{Trad} = GVA_t^{Tran} = GVA_t^{Fin} = GVA_t^{Com}$

1.	$[L_t^{Agr}]\ GVA_t^{Agr} - [L_t^{Min}]\ GVA_t^{Min} = 0$
2.	$[L_t^{Agr}]\ GVA_t^{Agr} - [L_t^{Man}]\ GVA_t^{Man} = 0$
3.	$[L_t^{Agr}]\ GVA_t^{Agr} - [L_t^{Util}]\ GVA_t^{Util} = 0$
4.	$[L_t^{Agr}]\ GVA_t^{Agr} - [L_t^{Con}]\ GVA_t^{Con} = 0$
5.	$[L_t^{Agr}]\ GVA_t^{Agr} - [L_t^{Trad}]\ GVA_t^{Trad} = 0$
6.	$[L_t^{Agr}]\ GVA_t^{Agr} - [L_t^{Tran}]\ GVA_t^{Tran} = 0$
7.	$[L_t^{Agr}]\ GVA_t^{Agr} - [L_t^{Fin}]\ GVA_t^{Fin} = 0$
8.	$[L_t^{Agr}]\ GVA_t^{Agr} - [L_t^{Com}]\ GVA_t^{Com} = 0$

Chi2 (8) = 72.16, Prob>Chi2 = 0.000

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