Comparative analysis of sources of growth in Tanzania, Uganda and Kenya: a growth accounting approach

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This paper was originally written by Mafutah D. Bunini under the supervision of Martin Zagler in partial fulfilment of the requirement of the Master in Applied Labour Economics for Development offered by the Turin School of Development of the International Training Centre of the ILO in partnership with the University of Turin and the Institut d'Etudes Politiques de Paris (Sciences Po). More information on the Masters Programme is available at http://maled.itcilo.org/.

Suggested citation for this paper

Bunini, M. D. 2017. Comparative Analysis of Sources of Growth in Tanzania, Uganda and Kenya: A Growth Accounting Approach. Turin School of Development Working Paper No. 5. International Training Centre of the ILO, Turin, Italy.

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Comparative Analysis of Sources of Growth in Tanzania, Uganda and Kenya: A Growth Accounting Approach

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Abstract

Sources of growth have been a subject of great debate in much literature. The discussion revolved around how much of physical capital, human capital, and Total Factor Productivity (TFP) contributed to growth. This paper examines sources of economic growth in Tanzania, Uganda and Kenya. The study adopts a growth accounting approach using a Cobb-Douglas production function to analyze and compare the contribution to growth of TFP, capital accumulation, labour and human capital. Secondary data over the period of 52 years from 1960 to 2011 were collected from the PWT website. Generally, although the results show a variation in sources of growth over time and across countries, economic growth in Tanzania and Kenya was dominated by TFP, whereas in Uganda it was driven by capital accumulation. Besides, improved growth was a result of the Government strategies to implement appropriate economic policies fostering domestic investment to create employment, and reduction of poverty.

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ABBREVIATIONS AND ACRONYMS

EAC	East African Community
ERP	Economic Recovery Programme
FDIs	Foreign Direct Investments
GDP	Gross Domestic Product
ILO	International Labour Organization
IMF	International Monetary Fund
MALED	Masters of Applied Labour Economics for Development
OECD	Organisation for Economic Co-operation and Development
PPP	Purchasing Power Parity
PWT	Penn World Tables
SSA	Sub-Saharan Africa
TFP	Total Factor Productivity
USA	United States of America

1 INTRODUCTION

Sources of growth have been greatly debated in much literature since the introduction of the growth accounting method. The discussion revolved around how much of growth is driven by the accumulation of physical and human capital and how much is attributed to productivity growth (Solow, 1957). To a great extent the miraculous growth of the East Asian countries has been taken as a case study in the discussion (Young, 1995; Krugman, 1994). Due to the assumption of diminishing returns in physical capital, Young (1995) and Krugman (1994) argue that the spectacular growth in the East Asian countries was a myth because it was driven by capital accumulation instead of Total Factor Productivity (TFP). Their assumption is empirically supported by literature which affirms that sustainability of long-term growth is not attributed to capital accumulation but rather to TFP. Therefore, understanding the underlying sources of economic growth is important for the long-term economic development of any country.

Since its introduction, the Solow Model has remained the benchmark in growth (Aghion and Howitt, 2007). The model shows that it is not possible to sustain long-term growth without technological progress due to the principle of diminishing marginal productivity.

According to new endogenous growth models, the rate of technological progress is determined by internal forces in the economic system (Romer 1990; Aghion and Howitt, 1992). They explained that technological progress depends on innovation and the incentive for innovation depends on policies favoring competition, intellectual property rights and trade openness.

Economists who have done growth accounting exercise concluded that to a great extent economic growth is attributable to capital accumulation (Jorgenson, 1995). However, according to Aghion and Howitt (2007) this finding is questionable because growth accounting results are sensitive to the way capital is measured; it is believed that capital is methodologically mis-measured. For example, while Young (1995) argues that the miraculous growth performance in Singapore, Hong Kong, Taiwan, and South Korea was a result of capital accumulation instead of technological progress, Hsieh (2002) claims that the results are not the same after correcting for overestimation of capital accumulation.

According to early detailed growth accounting exercises, capital accumulation per labour accounted for between one-eighth and a quarter of the GDP growth rates in the United States and other industrial countries, whereas in many countries the TFP growth accounted for more than half of the GDP growth (Solow, 1957; Denison 1962,1967). However, later studies showed that contribution of capital accumulation and TFP growth rates on GDP growth rate depends on the quality of labour and capital (Jorgenson, 1995). Easterly and Levine point out that without taking into account the improvement of labour and of capital, the unmeasured improvements will be inappropriately assigned to TFP. Even after incorporating the quality of human and physical capital, studies have shown that the TFP growth accounts for a large portion of GDP growth. Despite large cross-country variations in growth accounted for TFP growth, TFP accounts for about 50 percent of GDP in OECD countries and 30 percent in Latin American countries (Young, 1995).

Over the last two decades many Sub-Saharan Africa (SSA) have experienced high growth rates which remained robust during global economic downturn (IMF, 2012). Despite many countries

being resource rich, some countries realized sustained high growth rates without exploiting natural resources. The IMF claims that high growth rates in these countries were attributed to enhanced macroeconomic management, robust institutions, increased aid and higher investment in both physical and human capital rather than to exploitation of natural resources.

Tanzania and Uganda were considered to be among non-resource rich low income Sub-Saharan African countries that experienced fast growth in the mid-1990s. According to a study conducted by the IMF, out of 12 fast growing countries in the SSA in the Mid-1990s, eight of them were considered to be low income non-resource rich. The study concluded that high growth in the region was contributed by debt relief, fiscal space through expansion in social spending and capital investment.

Kenya's economy is the largest in the East African region and is the third largest after South Africa and Nigeria in the SSA (Mkhabela, 2011). Kenya has a well-structured economy that can serve as an engine of economic growth in the East Africa. According to Kenya Economic Report (2013) the most important source of GDP growth in Kenya is the service sector accounting for about 50 percent. Despite its size, Kenya's economy is not fast growing like its neighboring countries Tanzania and Uganda.

Although there are numerous publications on determinants of economic growth in Sub-Saharan Africa, only a few of them used the growth accounting method. The majority of the publications have shown that capital accumulation was the main source of growth while TFP played the minor role. Similarly, the IMF claimed that average real growth in SSA was mainly attributed to capital accumulation with little or no role of TFP. Also, the IMF argues that recent increase in growth when comparing periods from 1997 to 2002 with those from 1990 to 1996 was associated with improvement in growth of TFP due to support programs from the IMF. This study examines sources of economic growth in Tanzania, Uganda and Kenya. Specifically, it analyzes the contribution to growth of Total Factor Productivity, capital accumulation, labour and human capital using a growth accounting approach. Eventually, the study compares the sources of growth for each country over a period of 52 years from 1960 to 2011.

This paper is organized in 5 Sections; Section 1, the introduction has covered background information, research motivation and objectives. Section 2 presents the literature review. Data analysis is presented in Section 3. Section 4 summarizes and briefly discusses the research findings. Lastly, conclusion, recommendations and study limitations are presented in Section 5.

2. LITERATURE REVIEW

Growth accounting is a common approach that has been widely used for analyzing contributions to economic growth. It is a preliminary step for the analysis of fundamental determinants of economic growth. According to Aghion and Howitt (2007) many studies on growth accounting exercises conducted in many countries have been concluding that economic growth is accounted for by capital accumulation. Nonetheless, they argue that despite the evidence, all the growth of output per worker is caused by technological progress. Similarly, Senhadji (2000) reports that capital accumulation cannot sustain growth while TFP can; hence it is crucial to understand sources of growth.

Despite the lack of agreement on fundamental aspects of the performance, the exemplary performance of East Asian economies has been the basis for large and varied literature explaining reasons for persistent high growth (Collins and Bosworth, 1996). They question whether or not growth is associated with high rates of physical and human capital accumulation or otherwise by the adoption of advanced economies technology together with increased capital accumulation.

On the other hand, some literature claims that the role of Government policies, particularly microeconomic policy, is vital. They argue that Asian economic growth is a proof of market friendly approaches such as open trade regime. In addition, Government strategies with targeted interventions, not laissez-faire have been a key for the growth to catch up with industrialized countries (World Bank, 1993; Krueger, 1993). But, there are still disagreements on the importance and transferability of active interventions because the role of the public sector versus the private sector in generating productivity growth is still unclear (World Bank, 1993; Collins and Bosworth, 1996; Stiglitz, 1996).

Furthermore, other literature questions the ability of traditional growth models to explain encountered economic growth. By exploring the models known as endogenous growth, they argue that rapid economic growth may be spurred by increases in efficiency (Barro and Sala-i-Martin, 1995; Helpman, 1991, 1994; Lucas, 1988; Pack, 1994; Romer, 1986, 1994). According to the model, while the productivity gains may induce capital accumulation, productivity gains themselves, not capital per se, are the fundamental cause of growth (Barro and Sala-i-Martin, 1992; Romer, 1990; King and Levine, 1994).

East Asian rapid economic growth can be largely explained by technological catch up. Their growth is due to the ability to extract and productively utilize relevant technological knowledge from industrial economies (Romer, 1993; Pack, 1992). Generally, much literature has concluded that rapid growth is a policy issue. Policies addressing openness to trade, imports of capital goods, FDIs, financial development and macroeconomic stability are paramount for helping closing up the technology gaps (Bell and Pavitt, 1993; Pack, 1992; Romer, 1993; Fagerberg, 1994).

Between 1990 and 2005, Jamaica had a high investment as a proportion of GDP compared to other Caribbean countries (Thomas and Serju, 2009). However, its economy consistently lagged behind by experiencing marginal growth rate of 1.3 per cent compared to average growth rate of 3.1 per cent

for the rest of the Caribbean countries. For example, during the same period, Trinidad and Tobago, Antigua, and St. Vincent grew at the rates of 5.3 per cent, 3.4 per cent and 4.6 per cent, respectively.

Early economic growth theories suggest that long-term economic growth could only be achieved through exogenous technological change, because changes in labour and capital only had temporary effects. On the contrary, Olsen (1996) claims that differences in technology, capital and labour do not sufficiently account for the differences in growth rates across countries but that the major factors in determining economic performance are quality of institutions as well as economic policies. Likewise, Sala-i-Martin (2002) cited in Thomas and Serju (2009) notes that the initial income level is the most important and robust factor in determining economic growth. He claims that the quality of institutions was important in determining economic growth performance. The institutions should focus on addressing free markets, property rights, democracy, political stability, a good health system, efficient financial institutions, and appropriate economic policies.

Similarly, some researches have shown that there is no simple determinant of economic growth (Thomas and Serju, 2009). This is supported by a study on identifying the major contributors to growth which was conducted using growth accounting approach for a period of 40 years from 1960 covering 84 countries which account for 95 per cent and 85 per cent of World's GDP and population respectively (Bosworth and Collins, 2003). It was found that on average labour productivity grew by 2.3 per cent, with improvements in total factor productivity and an increase in physical capital per worker contributing to 1.0 per cent each while human capital contributed to roughly 0.3 per cent. These studies indicate that there is a significant relationship between growth and factors such as quality of institutions, geographical location, and trade openness. They explain that while the quality of institutions worked through TFP growth, budget balance and trade openness functioned mainly through capital accumulation.

Again, the main causes of divergence in economic performance across countries are quality of institutions and policies adopted (Ramkissoon, 2002; Da Costa, 2007). Besides, they claim that factors such as the type of the economy (service oriented economy), social cohesion, and initial condition played significant role in determining economic performance.

Furthermore a study conducted using growth accounting exercise and regression analysis to identify reasons for Guyana's growth stagnation from 1998 to 2004, following significant economic performance from 1991 to 1997, shows that the country's growth slowdown was attributed to adverse terms of trade, weak infrastructure and exogenous shocks (Staritz et al. 2007). But, on the other hand, it was pointed out that a perpetual decrease in factor accumulation, deterioration in political and institutional environment, massive labour migration and decrease in private and foreign direct investment were causes for persistent poor growth performance.

The results of the studies on the source of growth using the growth accounting approach depends on the specification of the production function. Much literature adopted the Cobb-Douglas production function, with the assumption that all countries have the same numerical specification and identical production technology. This study uses the same production function estimate for each country to evaluate the effect of the growth rate of physical capital accumulation, TFP, human capital and labour on the growth rate of the real GDP. The analysis covers three countries over the period of 52 years from 1960 to 2011.

The study revisits the issue of the sources of economic growth in East African Countries, namely Tanzania, Uganda and Kenya. It adopts the growth accounting approach by analysing the effect on output of the accumulation of physical capital, human capital, labour, and total factor productivity on GDP growth. Although growth accounting has been subject to criticism that it cannot identify the fundamental causes of growth, it is still very informative because it provides a consistent decomposition of growth among different sources (Collins and Bosworth, 1996). The approach avoids some problems associated with cross-country regression analysis and does not need taking a stand on appropriate underlying model of growth (Mankiw, 1995).

3 DATA AND METHODOLOGY

The research used secondary data on real output (GDP), capital stock, employment level (labour), human capital, and total factor productivity for Tanzania, Uganda and Kenya over the period of 52 years from 1960 to 2011. The three countries were selected based on their similarities in terms of colonial history, ethnic ties, trade cooperation and neighborhood. Also, they are the pioneers of the East African Community. With the exception of the TFP data which were estimated, data for other variables were collected from the Penn World Tables (PWT) website where an updated version, PWT version 8.0, was accessed. The real GDP for all countries was measured at purchasing power parity (in million 2005 US\$), employment level was given as a number of persons engaged (in million), human capital was measured as an index of human capital per person based on years of schooling and returns on education as provided by Barro and Lee (2012).

The study uses a Cobb-Douglas production function to estimate the effect of physical capital, labour, human capital and productivity on real GDP growth. Unlike the textbook Solow Model which uses the production function without the human capital, this study adopts an augmented Solow Model in which the human capital accumulation is added to the function. The human capital was included in order to increase precision of the model because ignoring it would lead to incorrect conclusions (Kendrick, 1976). Inclusion of human capital causes accumulation of physical capital and population growth to have more impact on income as it is correlated with savings and population growth rates (Mankiw et al., 1992). Thus, the augmented Solow Model was adopted as presented in the following production function:

$$Y_{it} = A_{it} K_{it}^{\alpha} H_{it}^{\beta} L_{it}^{\gamma} \tag{1}$$

Where Y_{it} represents Real Gross Domestic Product (GDP) at PPP; A_{it} is level of technology, K_{it}^{α} is the physical capital, L_{it}^{γ} is total employment, and H_{it}^{β} is an index of human capital. Hence, $H_{it}^{\beta} L_{it}^{\gamma}$ is a skilled-adjusted measure of labour input (augmented labour). The superscript $\alpha = \beta = \gamma = 1/3$ and subscript *it* represents country and time variances whereby *i=1… 3* countries and *t=1, …, 52* years.

The TFP which is also referred as multi-factor productivity is a variable that accounts for the effects on total output (GDP) growth not caused by traditionally measured factors of production such as labour and capital. In order to account for effects on GDP not caused by labour and capital, the TFP was measured using the Solow Residual method. In this case, the level of technology (A_{it}) for each country was estimated by transforming equation (2) into logarithms[1] and solving for A_{it} as an exponent of a natural logarithm.

$$A_{it} = Y_{it}/(K_{it}^{\alpha} H_{it}^{\beta} L_{it}^{\gamma}) \tag{2}$$

Taking logarithms and differentiating totally both sides of equation (1) yields a growth equation (3)

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[1]Transforming equation (2) into logarithms yields: $log_e{}^{A_{it}} = log_e{}^{Y_{it}} - \alpha log_e{}^{K_{it}} - \beta log_e{}^{H_{it}} - \gamma log_e{}^{L_{it}}$

The technology level A_{it} was solved as follows: $A_{it} = e^{(log_e{}^{Y_{it}} - \alpha log_e{}^{K_{it}} - \beta log_e{}^{H_{it}} - \gamma log_e{}^{L_{it}})}$

$$\hat{y}_{it} = \hat{a}_{it} + \alpha \hat{k}_{it} + \beta \hat{h}_{it} + \gamma \hat{l}_{it} \quad (3)$$

Where:

$$\hat{y}_{it} = \frac{\dot{Y}_{it}}{Y_{it}} \; ; \; \hat{a}_{it} = \frac{\dot{A}_{it}}{A_{it}}; \; \hat{k}_{it} = \frac{\dot{K}_{it}}{K_{it}}; \; \hat{h}_{it} = \frac{\dot{H}_{it}}{H_{it}} \; ; \; \hat{l}_{it} = \frac{\dot{L}_{it}}{L_{it}} \quad (4)$$

From equation (3) the lower case variables with a "hat" correspond to the growth of the upper case variables described in equation (1). Thus, given that $\dot{Y}_{it}; \dot{A}_{it}; \dot{K}_{it}; \dot{H}_{it}; and \; \dot{L}_{it}$ are variable change over time, the growth rate "g" of each variable, every year could be computed using the expression (4) above. In this case, the level of technology (A_{it}) and the TFP $(\hat{a}_{it})$ for each country over the period of the study could be estimated using equation (5) below.

$$TFP = (Y_{it} - Y_{it-1})/Y_{it-1} - \alpha(K_{it} - K_{it-1})/K_{it-1} - \beta(H_{it} - H_{it-1})/H_{it-1} - \gamma(L_{it} - L_{it-1})/L_{it-1} \quad (5)$$

Alternatively, given that technology level in the current and the previous years are A_{it} and A_{it-1} respectively, A_{it} can be expressed in terms of (g), A_{it-1} and A_{it-2} as follows:

$$A_{it} = A_{it-1} + g(A_{it-1}) = (1+g)A_{it-1} \quad (6)$$

But, since $A_{it-1} = (1+g)A_{it-2}$

$$A_{it} = (1+g)(1+g)A_{it-2} = (1+g)^2 A_{it-2}$$

$$(1+g) = \left[\frac{A_{it}}{A_{it-2}}\right]^{1/2}$$

Thus,

$$g = \left[\frac{A_{it}}{A_{it-2}}\right]^{1/2} - 1 \quad (7)$$

In general, equation (7) can be written as a geometric series in a general form as follows:

$$g = \left[A_{it+n}/A_{it}\right]^{1/n} - 1 \quad (8)$$

The sub-script 't' in equation (8) represents the starting year, t = 1960; and 'n' stands for time period ranging from n = 1, 2,3, …. 51, 'A' stands for any variable such as Real GDP (Y), Physical capital (K), Labour (L), Human capital (H) and Technology (A). Therefore, instead of using equation (5),

equation (8) was used to estimate the growth rate of each variable and expressed in percentage points as shown below:

$$TFP = \left[A_{it+n} / A_{it} \right]^{1/n} * 100 - 100.$$

The study adopted equation (8) which is a geometric series because the geometric compounded average growth rate or geometric series is more appropriate when analyzing over a long horizon (Hallerbach, 2005). Moreover, according to the Law of Large number and based on the assumption of Independent and Identical distribution, the Geometric mean is more likely to converge to the constant.

Furthermore, from the intuition behind equation (3), it can be noted that growth accounting for the Real GDP is a summation of the growth rates of Technology (TFP), physical capital, human capital and Labour but physical capital, human capital and Labour should be multiplied by a scalar equivalent to their respective shares which are $\alpha = \beta = \gamma = 1/3$.

4. FINDINGS AND ANALYSIS

This section presents the research findings and a brief account for sources of economic growth for each country. It has three main sub-sections. The first sub-section analyses contribution of TFP and correlation between the GDP growth and factors of production. The next sub-section presents a growth accounting analysis of the contribution of all factors such as TFP, capital accumulation, labour and human capital to GDP growth. The last part of the Section presents a comparative analysis of sources of growth in the three East African countries.

4.1 Growth of TFP and correlation between GDP and production factors' growth

4.1.1 Total Factor Productivity

As explained in the previous Section, the technology growth (TFP) for each country was estimated using equation (8) that was expressed in percentage as follows:

$$TFP = \left[A_{it+n} \big/ A_{it} \right]^{1/n} * 100 - 100$$

The results show that in the mid-60s Tanzania experienced the highest TFP growth of about 7.6 percentage points compared to Uganda and Kenya who had 2.0 and 3.8 percentage points respectively. Between the mid-60s and late 80s the TFP for Tanzania and Uganda declined drastically. The situation was worse in Uganda because from the late 1970s to mid-1990s the country registered a negative growth in TFP. Similarly, Tanzania experienced a negative growth rate in TFP between the mid-1980s to the late 1990s. Unlike Tanzania and Uganda, Kenya had a more stable TFP growth though smoothly decreasing. The figure below illustrates the trend of TFP for the three countries.

Figure 1 **TFP growth by country, 1961-2011** (in % points)
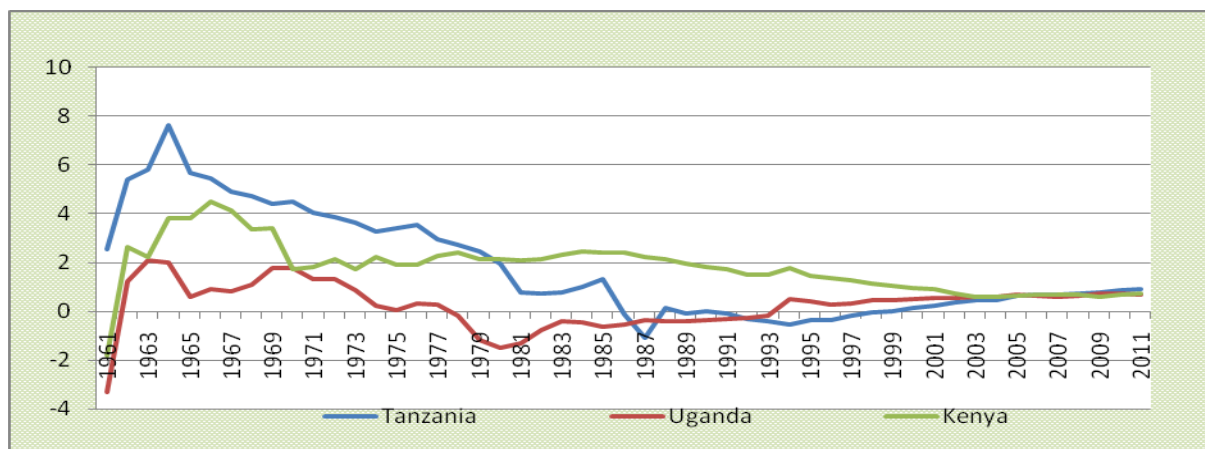
Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).

4.1.2 Correlation between GDP growth and TFP and other factors of production

The results show that in all the three countries, the growth of TFP was positively correlated with the GDP growth. Table 1 below shows that the TFP and GDP growth had a correlation coefficient of 0.97, 0.93 and 0.76 in Tanzania, Kenya and Uganda respectively. This indicated that there was a strong positive linear relationship between growth of GDP and TFP in all the three countries.

On the other hand, though positively correlated with the GDP growth, the other factors (Capital, Human capital, and Labour) had smaller correlation coefficients: less than 0.5 in Kenya and Uganda. This indicated that physical capital, human capital, and labour had weak positive linear relationship with the GDP growth. In contrast, as shown in Table 1 the same factors had negative correlation with the GDP growth in Tanzania. The results show that the correlation coefficient between GDP growth and physical capital, human capital and Labour in Tanzania was -0.23, -0.67 and -0.91 respectively. Although physical capital indicated a weak negative linear relationship, labour indicated a strong negative linear relationship suggesting that Tanzania experienced a decreasing labour productivity.

Table 1 **Correlation Coefficient between GDP and other factors of production, by country, 1960-2011**

Factors of Production	Tanzania	Uganda	Kenya
Capital	-0.23	0.50	0.29
Human Capital	-0.67	0.04	0.38
Labour	-0.91	0.35	0.22
TFP	0.97	0.93	0.76

Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).

The results in Figure 2 show that GDP growth was oscillating in the same direction with the TFP growth. It can be noted that during the 1960s all countries experienced the highest growth of both GDP and TFP but over time the growth fluctuated correspondingly with performance of the TFP. For instance, in Tanzania, during the 1980s when the TFP was at its worst, about negative 1.11 percent, the country experienced the lowest GDP growth of about 2.20 percent (see Appendix A). Similarly, in Uganda, between late 1970s and early 1980s the country experienced the lowest GDP growth of about 1.23 percent when it realized the worst TFP of about negative 1.49 percent (see Appendix B). Thus, based on these results it can be concluded that the TFP was the main driver of growth in all the three countries.

Figure 2 **GDP, TFP and other factors growth trend, by country, 1961-2011** (% points)
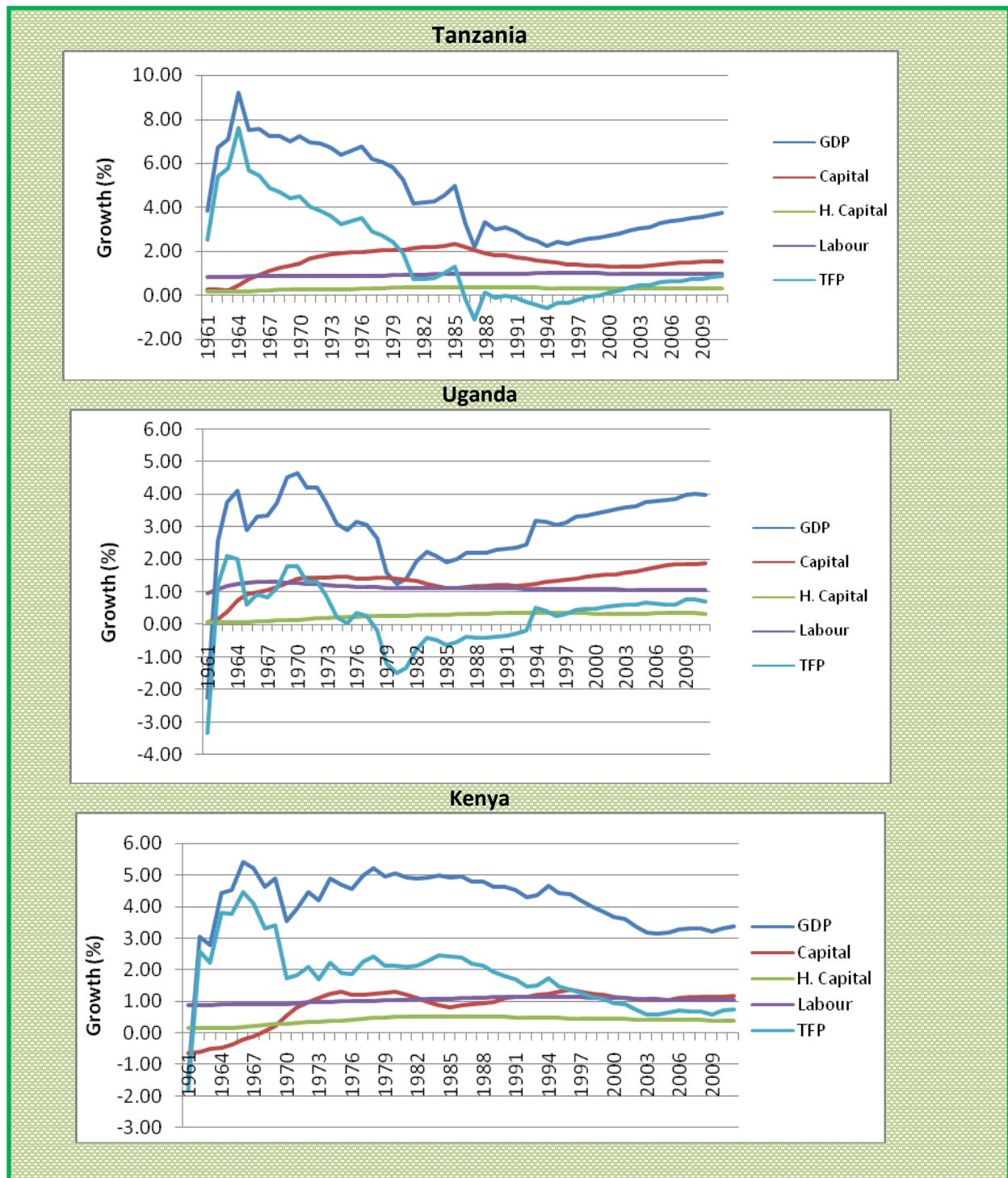
Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).

4.2 Growth Accounting

This sub-section presents the contribution of TFP, capital stock and human capital on GDP growth for each country over the period of 52 years from 1960 to 2011.

4.2.1 Sources of Growth in Tanzania

The results show that the economic growth in Tanzania was attributed to improvement in TFP, capital stock and human capital because all these factors had a positive contribution to the GDP. Moreover, the contribution of each factor shows that growth was dominated by TFP growth. While the TFP contributed to an average of about 38 percent or 1.76 percentage points of the GDP growth, capital stock and human capital contributed to an average of about 34 percent or 1.55 percentage points and 7 percent or 0.31 percentage points respectively (see Figure 3 and Table 2). Thus, TFP has been the main contributor to the GDP growth in Tanzania over the period of 52 years from 1961 to 2011.

Table 2 **GDP and factor contribution to growth in Tanzania, 1961-1985, 1986-1999, 2000-2011** (% points)

Period	GDP Growth	Contribution from Capital	Contribution from Human Capital	Contribution from Labour	Contribution from TFP
1961-1985	6.27	1.55	0.28	0.89	3.48
1986-1999	2.70	1.67	0.34	0.97	-0.27
2000-2011	3.27	1.43	0.32	0.96	0.55
1961-2011	4.58	1.55	0.31	0.93	1.76

Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).

Since independence from 1961 through 1985, GDP growth was dominated by TFP growth. Figure 3 below indicates that TFP contributed to an average of about 56 percent or 3.48 percentage points whereas the remaining factors all together contributed to about 44 percent, or 2.68 percentage points.

Figure 3 **GDP and factor contribution to growth in Tanzania, 1961-2011** (% points)
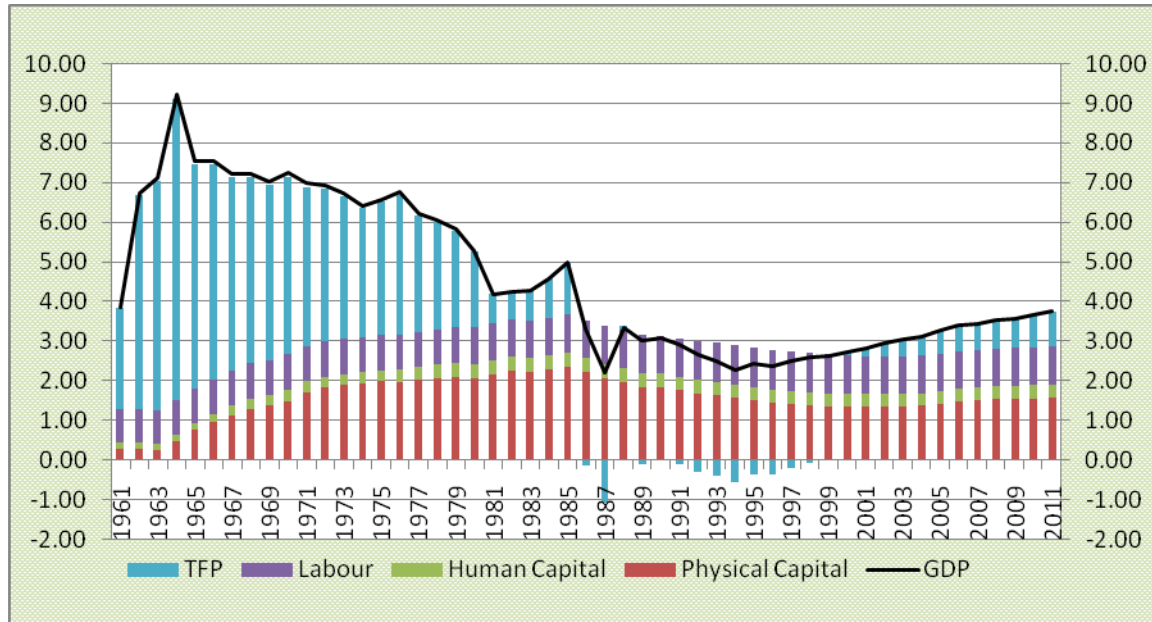
Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).

However, from 1986 to 1999 the TFP could not account for GDP growth. The results indicate that from 1986 to 1999, the TFP growth had negative contribution to the GDP growth. Over this period, growth was attributed to growth in capital stock, human capital and labour. Figure 3 illustrates that during this period growth was dominated by growth in capital stock which contributed to an average of about 62 percent or 1.67 percentage points of the GDP growth.

Also, growth in capital stock continued to be dominant over the next sub-periods between 2000 and 2011. Figure 3 reveals that while capital contributed to growth at an average of about 44 percent or 1.43 percentage points, labour, human capital and TFP all together contributed to about 56 percent or 1.84 percentage points. Finally, despite positive contribution from capital, labour and human capital, throughout the whole period of study, the TFP was the key driver to the economic growth in Tanzania.

Generally, Tanzania economic history can be divided into four periods from independence in 1961 to 2011. The period from independence to the Arusha Declaration (1961–1967) referred as the pre-Arusha declaration period; the Pre-Crisis period (1968-1978) which was during the collapse of the coffee boom; the Crisis period (1979 – 1985) when the country experienced the effects of War against Uganda and the second OPEC oil price shock until the resignation of the first President of Tanzania Mr. Julius K. Nyerere; and the economic reform period (1986 – 2011) during which the Government adopted major IMF structural adjustment programs (Bigsten and Danielsson, 1999).

During the pre-Arusha declaration period (1961-1967) the Government introduced Africanisation ideology but there were no major changes on economic policies different from those that were implemented during the colonial era (Bigsten and Danielsson, 1999). In this period there was an open economy greatly depending on exportation of commodities, a steady growth in capital formation, macroeconomic stability and a favorable balance of payments. However, inequalities increased and as a result in 1967 a new strategy of African socialism referred to as the Arusha Declaration was introduced.

The aim of the Arusha declaration was to strengthen internal capacity and increase state control over the economy. By early 1970s, most of the economic activities including banking and industrial sector had been nationalized, and the State had control over the international and private retail trades and a National Price Commission was in place. As it can be noted in Figures 2 and 3, during the pre-crisis period (1968-1978), though capital stock continued to grow at an increasing rate, both GDP and TFP grew at a decreasing rate.

Throughout the 1970s the investment programme was state-led but supported by donors. Although many bilateral donors supported the investment, the World Bank and the IMF were against Government policies on domestic pricing mechanism, import substitution, and the exchange rate (Collier, 1991). Nevertheless, under the leadership of President Nyerere the Government took a hard line standing and continued to pursue such policies.

During the crisis period (1979-1985) there was a high increase in fiscal deficit which was a result of Uganda War in 1978. In this period the Government tried to finance the increased spending and continued to implement the import substitution policy while exports declined. Eventually, the government conflicted with donors over the macroeconomic policies. After unfruitful negotiations with the IMF, the Government adopted its own Economic Survival programme in 1981-1982 but it was unsuccessful. The egalitarian principles set out during the Arusha Declaration discouraged donors, most of which, from 1983, started to withdraw their support (Bigsten and Danielsson, 1999).

During the reform period from 1986 to 2011 the Government accepted IMF conditions and a World Bank structural adjustment programme. It undertook an Economic Recovery Programme (ERP) by implementing a wide range of policies addressing trade liberalization, free exchange rate regime and domestic saving, and fiscal stability. However, due to internal resistance, the ERP seemed to be a crisis management rather than a definitive move to a market-oriented economy (Mans, 1994). Meanwhile, between 1986 and 1992 the exchange rate depreciated rapidly because it was discretionarily adjusted by the Central Bank. Therefore, in order to allow market determined exchange rate, in July 1993 the Central Bank opened up weekly exchange auctions (Wangwe et al., 1998).

From 1995, a new Government came into power and was able to restore donors' confidence. Subsequently, in order to strengthen Economic reforms, the Government entered into a new agreement with the IMF and other donors. As a result from 1995 through 2011 the country achieved a significant and consistent GDP growth as illustrated in Figure 3. Also, Table 2 shows that during this period growth was driven by capital accumulation which accounted for about 43.7 percent or 1.43 percentage points of the GDP growth from 2000-2011. In a nutshell, it can be

concluded that good governance and appropriate economic policies are important for growth because they attract both domestic and foreign investments.

4.2.2 Sources of Growth in Uganda

Overall results portray that all factor accounted for economic growth in Uganda during the period of study. In addition, capital and labour were the main contributors with a contribution of about 45 percent or 1.30 percentage points and about 39 percent or 1.15 percentage points of the GDP growth respectively. On the other hand, human capital and TFP accounted for the lowest growth at an average of about 10 percent or 0.27 percentage points and about 6 percent or 0.27 percentage points of the GDP growth respectively (see Figure 4).

Moreover, while the contribution of TFP worsened over time, the contribution of capital and labour improved significantly. As it can be noted in Table 3 below, from 1961 to 1977 labour and capital contributed the highest about 38 percent or 1.21 percentage points and 33 percent or 1.06 percentage points of the GDP growth respectively, where as TFP and human capital contributed to about 24 percent or 0.78 percentage points and 5 percent or 0.15 percentage points respectively. This was the period after independence from the British colonial rule. It was the period during which the Government adopted some measures to mobilize alternative sources of funds to finance development programmes (Obwona, 2001). As a result Uganda Industrial Act of 1963 and the Foreign Investment (Protection) Act of 1964 were adopted in order to promote foreign and local investors. According to Obwona the Government strategy which focused on promoting industrialization was considered to have both backward and forward linkages in creating employment. Hence, Government efforts had a significant impact on productivity growth which was associated by growth of capital and labour.

Table 3 **GDP and factor contribution to growth in Uganda, 1961-1977, 1978-1993, 1994-2011** (% points)

Period	GDP Growth	Contribution from Capital	Contribution from Human Capital	Contribution from Labour	Contribution from TFP
1961-1977	3.23	1.06	0.15	1.21	0.78
1978-1993	2.06	1.24	0.31	1.11	-0.59
1994-2011	3.55	1.58	0.35	1.06	0.55
1961-2011	2.97	1.30	0.27	1.13	0.27

Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).

On the other hand, some policy strategies which were adopted could not attract FDIs. Under the leadership of President Milton Obote I, the Government implemented the nationalization policy that was executed under the ideology of socialism which was referred as the "1968 Common Man's Charter". Obwona reports that Uganda's economy was dominated by a few British-Asians who controlled commercial and industrial sectors; a situation which was considered by the Government as unsustainable to the economy. However, Foreign Investors were unpleased with the nationalization policy. This created political pressure, as a result in January, 1971 the Civilian Government was overthrown by the army led by the Chief of Defense Forces General Idi Amin.

According to the Economic Policy Research Centre (2013) the socialist growth and development path that was instituted by the Obote I regime deteriorated when the military Government took over.

Furthermore, during the Idi Amin era, from 1971 to 1979 insecurity and political instability contributed to the growth fluctuation. The Economic Policy Research Centre reports that Uganda experienced an economic crisis after the expulsion of the British-Asians, confiscation of foreigners' assets and businesses. Consequently, the industrial and commercial sectors collapsed. Some of the confiscated businesses were given to Ugandans while others were put under the management of Uganda Development Cooperation and Government Ministries. In this case, FDIs was unfavorable due to political instability, insecurity and nationalization. Even though capital seemed to be stable, it can be noted that nationalization policy resulted into a significant decline in GDP due to decline in TFP growth and inadequate technical capacity.

Again, even after the Idi Amin era, from 1979 to 1993, the country experienced great depression which was attributed to a negative growth in TFP. The results show that during this period, capital's contribution to the GDP growth was about 60 percent or 1.24 percentage points compared to TFP's contribution of about negative 29 percent or negative 0.59 percentage points (see Table 3 and Figure 4). Despite significant contribution from capital and labour growth over this period, negative contribution from TFP led to the lowest economic growth at an average of about 2.1 percentage points.

Figure 4 **GDP and factor contribution to growth in Uganda, 1961 - 2011** (in % points)
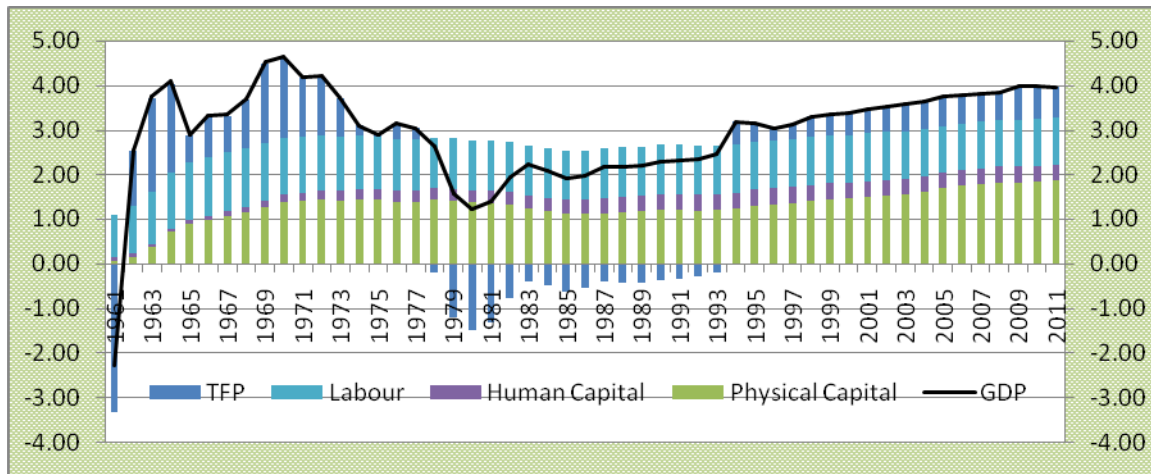
Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).

On the other hand, from 1994 growth started to pick up as the TFP improved. The results demonstrate that from 1994 to 2011 the GDP growth was explained by positive contribution from all factors with capital dominating at an average of about 44 percent. According to Obwona (1998) improved growth was a result of the Government strategies to improve FDIs inflows. He reports that the Government undertook economic policy reforms such as foreign exchange rates reforms,

economic liberalisation, conclusion of bilateral investment protection and promotion of treaties, and accession to multilateral treaties.

In addition, the Uganda Investment Authority (UIA) established in 1991 was empowered to enhance investment climate, approve new businesses, disseminate up-to-date investors' information and design national investment policy. The Authority conducted a number of promotional meetings in USA, Europe, India, Thailand and South Africa. In general, the overall results show that economic growth in Uganda was mainly attributed to capital accumulation. This indicates that the investment promotion strategies that were carried out were effective in attracting investors.

4.2.3 Sources of Growth in Kenya

The results suggest that Kenya had a recession in 1961 which was attributed to negative growth in both capital and TFP. However, as shown in Figure 5, from 1962 to 1970 growth improved significantly as TFP improved, though till 1967 capital growth remained negative. During this period, growth was dominated by the contribution of the TFP growth (see Table 4). It contributed to about 75 percent or 2.77 percentage points of the average growth of about 3.71 percentage points of the GDP. However, while labor and human capital accounted for 24 percent or 0.90 percentage points and 6 percent or 0.21 percentage points respectively, capital accounted for negative 5 percent or negative 0.20 percentage points of the GDP growth. Thus, from 1961 to 1970 economic growth in Kenya was driven by TFP.

Table 4 **GDP and factor contribution to growth in Kenya, 1961-1970, 1971-1995, 1996-2011** (% points)

Period	GDP Growth	Contribution from Capital	Contribution from Human Capital	Contribution from Labour	Contribution from TFP
1961-1970	3.71	-0.20	0.21	0.90	2.77
1971-1995	4.71	1.10	0.47	1.06	2.02
1996-2011	3.53	1.16	0.43	1.08	0.84
1961-2011	4.14	0.87	0.41	1.04	1.79

Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).

Again, the TFP growth continued to dominate GDP growth contribution in the subsequent periods. Table 4 and Figure 5 illustrate that compared to the other periods, during the period from 1971 to 1995 the country experienced relatively better and stable growth at an average of 4.71 percentage points whereby about 43 percent or 2.02 percentage points was attributed to the TFP growth. Yet other factors such as capital accounted for about 23 percent or 1.10 percentage points, labour about 23 percent or 1.06 percentage points, and human capital about 10 percent or 0.47 percentage points.

On the contrary, from 1996 to 2011 the country experienced a persistent decline in GDP growth from 4.39 percentage points in 1996 to 3.38 percentage points in 2011. During this period the economy grew at an average of about 3.53 percentage points with capital being the dominant component contributing to about 33 percent or 1.16 percentage points followed by labour which

contributed to about 31 percent or 1.08 percentage points. This time, compared to the previous periods, contribution from TFP dropped to about 24 percent or 0.84 percentage points and human capital contributed to about 12 percent or 0.43 percentage points. With the exception of capital which had a negative contribution from 1961 to 1967, all factors contributed positively to GDP growth. Generally, Kenya's economic growth over the period of study was dominated by the TFP followed by capital. Figure 5 and Table 4 show that TFP contributed to about 43 percent or 1.79 percent points of the GDP growth.

Figure 5 **GDP and factor contribution to growth in Kenya, 1961 - 2011** (in % points)
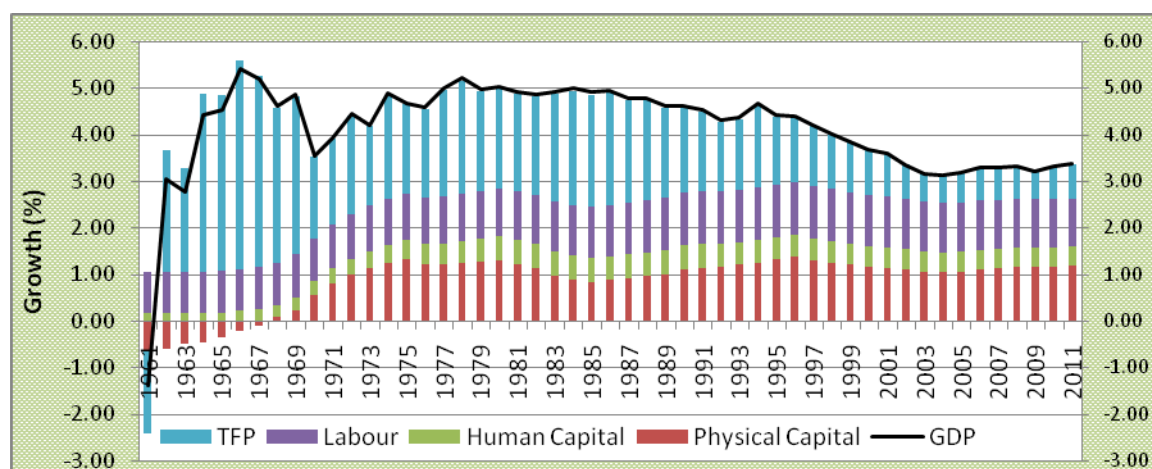
Source: Author's calculations based on equations (3) and (8) and data from PWT(2014).

In a nutshell, economic growth in Kenya has taken a different trend over time (Odhiambo, 2008). This is because Kenya experienced post-election ethnic violence that was always accompanied by economic downturn, unemployment, poverty and corruption (Ajulu, 1998). Kenya's ethnic conflicts are traceable to the colonial era where the British Colonial regime introduced a "divide and rule" ideology in order to create a smooth colonial dominance. This strategy enabled the British to keep the big tribes, the Luo and Kikuyu, divided. Consequently, until its independence in 1963, some ethnic groups emerged to be economically better off compared to others. Eventually, Kenya inherited colonial inequalities in terms of power and wealth sharing between ethnic groups and regions (Omolo, 2002).

After colonial period, Kenya failed to build national unity. Ethnic conflicts skewed accession to state's scarce resources. Under the regime of President Jomo Kenyatta, the Kikuyu had dominance over both political and economic matters at the expense of citizens from other ethnic groups (Ajulu, 2002). Even during President Moi's regime, the discrimination continued as his tribe, the Kalenjins, was highly favoured to occupy Government positions. This resulted into political electoral related disputes. For example, before the 1997 elections, there was election-related violence where thousands were injured and killed. As a result members of the Kikuyu and Luo ethnic groups were displaced. Essentially, the violence intended to discourage the majority of the Kikuyu to turn out for voting. In turn, the coalition of minority ethnic party, KANU under the leadership of Moi, won against the majority Kikuyu and Luo (Ajulu, 1998).

4.3 Comparison of Sources of Growth in Tanzania, Uganda and Kenya

This sub-section presents a comparative analysis of growth difference between the three East African countries that got independence from the British colonial in the 1960s. From the historical point of view, Tanzania became independent in 1961 followed by Uganda and Kenya in 1962 and 1963 respectively. The results indicate that after independence all countries experienced significant economic growth which was accounted for positive growth in capital accumulation; labour and TFP with the exception of Kenya which experienced a negative growth in capital accumulation from 1961 through 1967 (see Figure 6).

The results reveal that in all countries TFP growth contributed positively to growth during the post independent period (See Table 5 and Figure 6). During 1961 to 1965, TFP accounted for the GDP growth of about 78 percent or 5.40 percentage points in Tanzania and 79 percent or 2.13 percentage points and 24 percent or 0.52 percentage points in Kenya and Uganda respectively. Likewise, during 1966 to 1970 it accounted for about 66 percent or 4.78 percentage points in Tanzania, about 72 percent or 3.41 percentage points in Kenya and 33 percent and 1.28 percentage points in Uganda. Thus, over the two sub-periods, the TFP growth dominated GDP growth in Tanzania and Kenya.

Unlike Tanzania and Kenya where growth was dominated by TFP growth, in Uganda the growth was dominated by labour growth. The results show that during sub-period 1961 to 1965 labour growth in Uganda accounted for 52 percent or 1.15 percentage points whereas in Kenya it accounted for 33 percent or 0.89 percentage points, and about 12 percent or 0.86 percentage points in Tanzania. Also, during sub-period 1966 to 1970 growth of labour attributed to GDP growth by about 33 percent or 1.30 percentage points in Uganda compared to about 19 percent or 0.91 percentage points, and about 12 percent or 0.88 percentage points in Kenya and Tanzania, respectively.

Furthermore, during the period 1961 to 1970, Uganda registered relatively better growth in capital accumulation. During this sub-period from 1961 to 1965 capital accumulation in Uganda contributed to a GDP growth of about 20 percent or 0.44 percentage points different from GDP growth of 5.7 percent or 0.39 percentage points experienced in Tanzania and a negative GDP growth of about 19 percent or negative 0.51 percentage points realized in Kenya. Also, during 1966 to 1970 the contribution of capital stock on GDP growth was still high in Uganda and relatively better in Tanzania and Kenya compared to the previous period.

In addition, Uganda and Kenya had the relatively highest contribution from the labour and human capital growth respectively. About 38 percent or 1.13 percentage points of Uganda's GDP compared to 20 percent or 0.93 percentage points and 25 percent or 1.04 percentage point of Tanzania and Kenya respectively were accounted for labour growth. Similarly, about 10 percent or 0.41 percentage points of Kenya's GDP compared to about 9 percent or 0.24 percentage points and 7 percent or 0.31 percentage points for Uganda and Tanzania were driven by human capital growth. Though with the least contribution, human capital had a positive effect on the GDP growth in all the three countries. The results show a positive trend in growth across the region. Kenya experienced the highest contribution to GDP growth accounted for human capital growth.

In general, growth accounting over the period under review show that the economic growth in the three countries can be explained by improvements of capital accumulation, and TFP. As it can be

noted from Table 5 and illustrated in Figure 6, economic growth in Tanzania and Kenya was dominated by TFP, where as in Uganda it was driven by capital accumulation. On average TFP growth accounted for about 38 percent or 1.76 out of 4.58 percentage points of GDP growth in Tanzania and about 43 percent or 1.79 out of 4.14 percentage points of GDP growth in Kenya. But in Uganda, it accounted for about 5 percent or 0.14 out of 2.71 percent points of the GDP growth. On the other hand, while in Uganda capital accounted for about 44 percent or 1.30 percentage points of the GDP growth, in Tanzania and Kenya it accounted for about 34 percent or 1.55 percentage points and 21 percent or 0.87 percentage points respectively. Hence, the major source of growth in Tanzania and Kenya was TFP while in Uganda it was capital accumulation.

Table 5 **GDP and factor contribution to growth, by Country, 1961-2011** (% points)

Period	GDP Growth	Contribution from Capital	Contribution from Human Capital	Contribution from Labour	Contribution from TFP
Tanzania					
1961 - 2011	4.58	1.55	0.31	0.93	1.76
1961 - 1965	6.89	0.39	0.16	0.86	5.40
1966 - 1970	7.25	1.23	0.25	0.88	4.78
1971 - 1975	6.72	1.85	0.28	0.89	3.62
1976 - 1980	6.03	2.03	0.33	0.90	2.70
1981 - 1985	4.45	2.24	0.36	0.94	0.91
1986 - 1990	2.99	1.96	0.36	0.96	-0.26
1991 - 1995	2.55	1.61	0.34	0.98	-0.36
1996 - 2000	2.56	1.37	0.33	0.98	-0.11
2001 - 2005	3.04	1.35	0.32	0.96	0.41
2006 - 2011	3.56	1.52	0.32	0.96	0.75
Uganda					
1961 – 2011	2.97	1.30	0.27	1.13	0.27
1961 - 1965	2.20	0.44	0.07	1.15	0.52
1966 - 1970	3.90	1.17	0.13	1.30	1.28
1971 - 1975	3.62	1.44	0.21	1.21	0.75
1976 - 1980	2.32	1.41	0.26	1.14	-0.46
1981 - 1985	1.91	1.25	0.29	1.12	-0.72
1986 - 1990	2.17	1.16	0.33	1.11	-0.43
1991 - 1995	2.69	1.22	0.36	1.09	0.01
1996 - 2000	3.24	1.41	0.35	1.08	0.40
2001 - 2005	3.59	1.58	0.35	1.06	0.60
2006 - 2011	3.89	1.82	0.35	1.04	0.67
Kenya					
1961 – 2011	4.14	0.87	0.41	1.04	1.79
1961 - 1965	2.69	-0.51	0.16	0.89	2.13
1966 - 1970	4.74	0.11	0.25	0.91	3.41

1971 - 1975	4.44	1.10	0.37	0.97	1.96
1976 - 1980	4.97	1.24	0.47	1.02	2.17
1981 - 1985	4.93	1.00	0.52	1.07	2.28
1986 - 1990	4.76	0.97	0.51	1.12	2.10
1991 - 1995	4.47	1.21	0.49	1.14	1.58
1996 - 2000	4.03	1.26	0.46	1.12	1.16
2001 - 2005	3.30	1.07	0.43	1.07	0.70
2006 - 2011	3.31	1.15	0.41	1.04	0.69

Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).

Figure 6 GDP and factor contribution to growth, by country, 1961-2011 (% points)
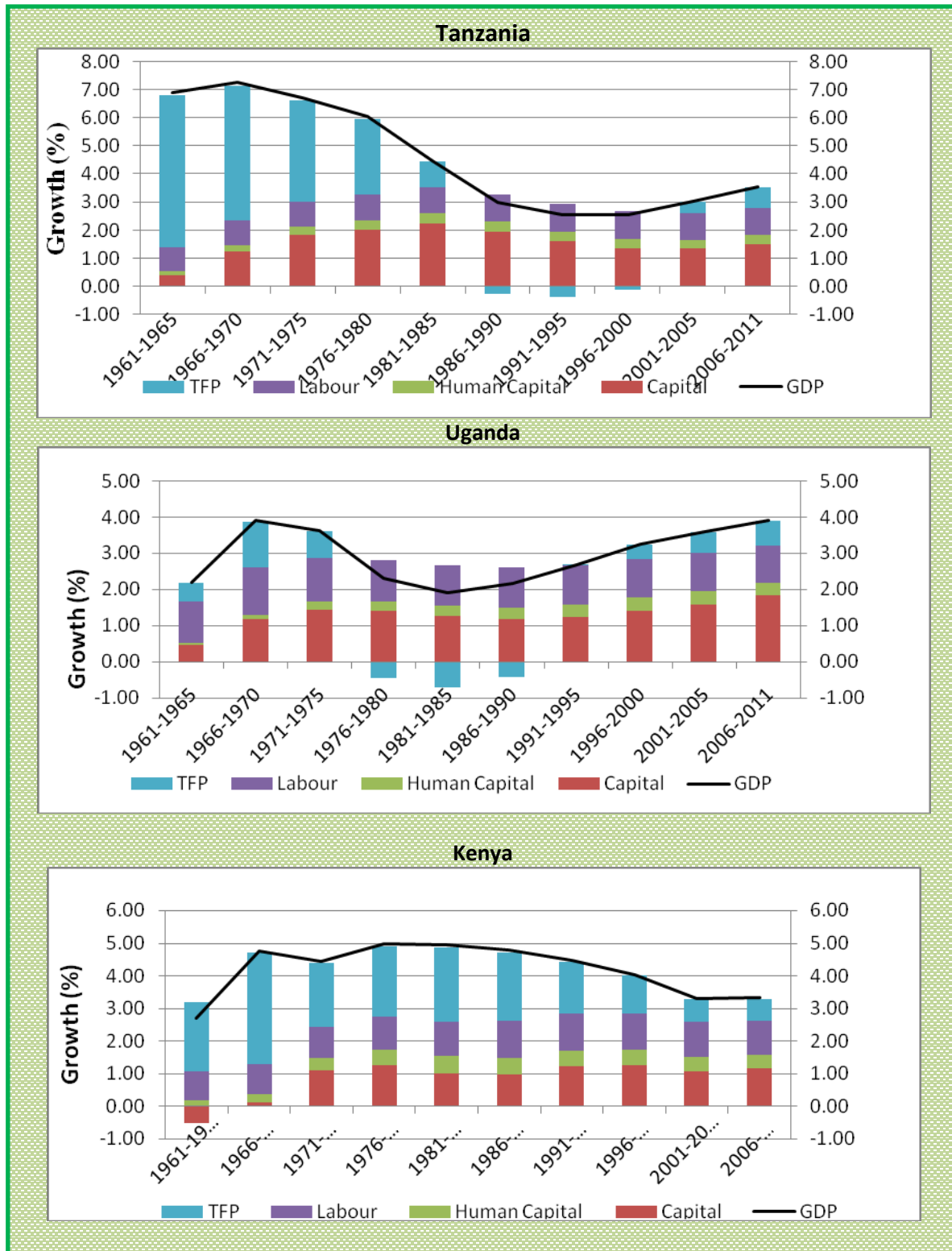
Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).

5. CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

5.1 Conclusion

This study reviewed sources of economic growth in Tanzania, Uganda and Kenya from 1960 to 2011. It focused on evaluating the contribution to GDP growth of Total Factor Productivity, capital accumulation, labour and human capital using a growth accounting approach. The growth accounting method using Cobb-Douglas production function was used to examine the effect of each factor of production on the economic growth. Additionally, in order to establish the relationship between the GDP growth and the other factors of production, correlation coefficients between the variables were estimated. This chapter summarizes the research findings and some key policy implications and recommendations.

The results show that in all the three countries, the growth of TFP was positively correlated with the GDP growth. These variables had very large correlation coefficient of 0.97, 0.93 and 0.76 in Tanzania, Kenya and Uganda respectively. In this case, there was a strong positive linear relationship between growth of GDP and TFP. Also, the results show that GDP growth was oscillating in the same direction with the TFP growth whereby the highest growth was realized when a country had the highest TFP and vice versa. Hence, this suggests that the TFP was the main driver of growth in all the three countries.

Furthermore, the results reveal that there was no one dominant factor contributing to growth over time. Sources of growth are accounted for a number of factors which are different from one country to another. The TFP and capital were found to be the overall major drivers of growth across the East African countries. It has been discovered that economic growth in Tanzania was attributed to improvement in TFP, capital stock and human capital. Although the overall results show that growth in the country was dominated by TFP, during some periods the dominant component was capital growth. Similarly, the overall results show that Kenya's GDP growth was mainly driven by TFP though in some years, especially from 1996 to 2011, growth was driven by labour productivity. On the contrary, the overall results portray that the major source of growth in Uganda during the period of study was capital followed by labour.

Moreover, apart from efficient utilization of factors of production, a number of factors accounted for the country difference in sources of growth. Some of these factors included economic policies, political stability, security and the business environment in the country. Poor economic policy and unstable political situation were found to be disincentives for both local and Foreign Direct Investment which has negative consequences on the economic growth.

Appropriate economic policies and trade openness are important for sustaining growth. The results have shown that during early1960s, all the three countries realized significant economic growth because this was a period just after independence and all the Governments were still executing economic policies inherited during the colonial era. However, from the mid-1960s growth in Tanzania and Uganda declined due to the adoption of inward-looking economic policies such as Nationalization whereby the state took control over economic activities. Such policies discouraged foreign investors and donors which resulted into poor growth.

Again, security and political stability is another important factor for growth. The results have shown that from 1971 to 1979 Uganda experienced growth fluctuation because of insecurity and political instability which were caused by the military Government. According to the Economic Policy Research Centre (2013), the country faced an economic crisis after the expulsion of the British-Asians, and confiscation of foreign investors' assets and businesses. Likewise, economic growth in Kenya took a different trend over time due to post-election ethnic violence (Odhiambo, 2008). Insecurity, political instability and violence hinder growth because they created unfavorable situation for FDIs.

5.2 Recommendations and study limitations

In view of the above findings and discussion, this study puts forward two main recommendations which are crucial for rapid and sustainable growth in developing countries such as Tanzania, Uganda and Kenya.

First, Governments should adopt appropriate policies addressing trade openness, imports of capital goods, FDIs, and macroeconomic stability. Also, the policies should focus on addressing investment in sectors potential for employing the majority of the workforce. Rapid growth is a policy issue because effective allocation and utilization of resources or factors of production depends on the quality of the policies implemented.

Second, Governments should strengthen and adopt quality institutions. Institutions are the norms and rules of the game of doing business (North, 1990). There is a positive correlation between economic growth and quality of institutions. According to Perkins et al. (2006) quality of institutions and good governance facilitates management of appropriate economic policies, lower transaction costs, attracts and it is an incentive for private investment. Therefore, to ensure investors' confidence, it is important to have robust institutions that address and focus on free markets, property rights, democracy, corruption, political stability, development of financial institutions, and provision of good social services such as education and health.

Lastly, due to time constraints and data limitation this study exclusively examined the effects of traditional factors of production: physical capital and labour on GDP growth. Moreover, human capital index and TFP were included in the analysis. However, given that growth is a function of many other factors, there is need for further exploration of sources growth in the East African countries. An extension of the analysis could include variables such as inflation, FDIs and terms of trade. Again, the role of Government expenditures, innovation and entrepreneurship in growth and employment creation is another gray area to research on.

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APPENDICES

Appendix A: **Factors contribution to GDP in Tanzania, 1961-2011** (% points)

Year	GDP Growth	Contribution from Physical Capital	Contribution from Human Capital	Contribution from Labour	Contribution from TFP
1961	3.86	0.27	0.16	0.85	2.54
1962	6.74	0.25	0.16	0.85	5.39
1963	7.11	0.23	0.16	0.85	5.78
1964	9.22	0.47	0.16	0.86	7.61
1965	7.53	0.74	0.16	0.87	5.66
1966	7.55	0.94	0.20	0.87	5.42
1967	7.23	1.12	0.23	0.88	4.90
1968	7.23	1.28	0.25	0.88	4.70
1969	7.02	1.35	0.27	0.89	4.41
1970	7.24	1.47	0.28	0.89	4.49
1971	6.98	1.68	0.28	0.89	4.02
1972	6.91	1.80	0.28	0.89	3.85
1973	6.74	1.87	0.28	0.88	3.62
1974	6.40	1.92	0.28	0.88	3.24
1975	6.58	1.96	0.28	0.89	3.37
1976	6.77	1.96	0.30	0.89	3.53
1977	6.21	2.01	0.32	0.90	2.92
1978	6.06	2.05	0.34	0.90	2.71
1979	5.82	2.08	0.35	0.91	2.44
1980	5.28	2.05	0.37	0.91	1.91
1981	4.17	2.15	0.36	0.92	0.74
1982	4.24	2.22	0.36	0.94	0.73
1983	4.27	2.21	0.36	0.94	0.77
1984	4.56	2.26	0.36	0.95	0.99
1985	4.98	2.35	0.36	0.96	1.31
1986	3.31	2.19	0.36	0.96	-0.16
1987	2.20	2.05	0.36	0.96	-1.11
1988	3.34	1.93	0.36	0.96	0.10
1989	3.00	1.82	0.36	0.97	-0.12
1990	3.08	1.81	0.36	0.95	-0.02
1991	2.92	1.74	0.35	0.96	-0.12
1992	2.65	1.67	0.35	0.97	-0.32
1993	2.48	1.61	0.34	0.98	-0.43
1994	2.27	1.55	0.34	0.98	-0.58
1995	2.42	1.50	0.33	0.98	-0.37
1996	2.37	1.43	0.33	0.99	-0.37
1997	2.49	1.39	0.33	1.00	-0.22
1998	2.58	1.36	0.33	0.99	-0.08
1999	2.63	1.34	0.32	0.98	-0.01
2000	2.72	1.33	0.32	0.97	0.10
2001	2.82	1.32	0.32	0.97	0.21
2002	2.95	1.32	0.32	0.96	0.34
2003	3.05	1.33	0.32	0.96	0.44
2004	3.09	1.35	0.31	0.96	0.46
2005	3.28	1.40	0.31	0.96	0.60
2006	3.39	1.46	0.32	0.96	0.65
2007	3.43	1.49	0.32	0.96	0.66
2008	3.54	1.52	0.32	0.95	0.73
2009	3.56	1.52	0.33	0.96	0.74
2010	3.66	1.54	0.33	0.96	0.83
2011	3.74	1.57	0.32	0.96	0.88

Source: Author's calculations based on equations (3) and (8) and data from PWT(2014).

Appendix B: **Factors contribution to GDP in Uganda, 1961-2011** (% points)

Year	GDP Growth	Contribution from Physical Capital	Contribution from Human Capital	Contribution from Labour	Contribution from TFP
1961	-2.27	0.07	0.07	0.95	-3.33
1962	2.55	0.16	0.07	1.08	1.21
1963	3.75	0.37	0.07	1.18	2.09
1964	4.09	0.72	0.07	1.24	2.00
1965	2.89	0.90	0.07	1.29	0.61
1966	3.31	0.97	0.10	1.31	0.91
1967	3.34	1.06	0.12	1.31	0.83
1968	3.71	1.14	0.13	1.31	1.10
1969	4.52	1.27	0.14	1.29	1.77
1970	4.64	1.39	0.15	1.27	1.79
1971	4.19	1.42	0.18	1.24	1.32
1972	4.21	1.44	0.20	1.23	1.31
1973	3.73	1.42	0.21	1.22	0.86
1974	3.10	1.45	0.23	1.20	0.22
1975	2.89	1.44	0.24	1.17	0.04
1976	3.14	1.39	0.25	1.16	0.34
1977	3.05	1.40	0.25	1.14	0.25
1978	2.62	1.44	0.26	1.13	-0.19
1979	1.58	1.42	0.26	1.13	-1.19
1980	1.23	1.38	0.27	1.12	-1.49
1981	1.40	1.36	0.28	1.12	-1.32
1982	1.94	1.34	0.28	1.12	-0.77
1983	2.23	1.24	0.29	1.12	-0.41
1984	2.09	1.17	0.30	1.11	-0.48
1985	1.91	1.12	0.31	1.11	-0.62
1986	1.98	1.11	0.32	1.11	-0.55
1987	2.18	1.14	0.33	1.11	-0.39
1988	2.18	1.16	0.33	1.11	-0.42
1989	2.19	1.17	0.34	1.11	-0.42
1990	2.29	1.22	0.35	1.11	-0.37
1991	2.31	1.20	0.35	1.10	-0.34
1992	2.35	1.19	0.36	1.10	-0.29
1993	2.45	1.20	0.36	1.09	-0.20
1994	3.19	1.24	0.36	1.09	0.50
1995	3.16	1.30	0.36	1.09	0.40
1996	3.04	1.33	0.36	1.09	0.26
1997	3.12	1.36	0.36	1.08	0.32
1998	3.30	1.41	0.35	1.08	0.46
1999	3.35	1.45	0.35	1.07	0.47
2000	3.39	1.48	0.35	1.07	0.49
2001	3.47	1.51	0.35	1.07	0.54
2002	3.52	1.54	0.35	1.07	0.57
2003	3.58	1.57	0.35	1.06	0.60
2004	3.63	1.62	0.35	1.05	0.61
2005	3.76	1.69	0.35	1.04	0.68
2006	3.77	1.75	0.35	1.04	0.63
2007	3.80	1.79	0.35	1.04	0.61
2008	3.84	1.82	0.35	1.04	0.62
2009	3.98	1.83	0.35	1.05	0.75
2010	3.99	1.84	0.35	1.05	0.75
2011	3.96	1.87	0.35	1.05	0.69

Source: Author's calculations based on equations (3) and (8) and data from PWT(2014).

Appendix C: Factors contribution to GDP in Kenya, 1961-2011 (% points)

Year	GDP Growth	Contribution from Physical Capital	Contribution from Human Capital	Contribution from Labour	Contribution from TFP
1961	-1.38	-0.62	0.16	0.87	-1.79
1962	3.06	-0.61	0.16	0.88	2.60
1963	2.79	-0.51	0.16	0.89	2.22
1964	4.44	-0.46	0.16	0.89	3.81
1965	4.53	-0.36	0.16	0.90	3.79
1966	5.42	-0.21	0.21	0.90	4.47
1967	5.21	-0.10	0.24	0.91	4.12
1968	4.62	0.07	0.26	0.91	3.33
1969	4.88	0.23	0.28	0.92	3.40
1970	3.55	0.56	0.29	0.92	1.74
1971	3.94	0.81	0.32	0.94	1.83
1972	4.46	0.99	0.35	0.96	2.11
1973	4.21	1.13	0.37	0.97	1.70
1974	4.90	1.24	0.39	0.99	2.24
1975	4.69	1.32	0.40	1.00	1.91
1976	4.58	1.22	0.43	1.01	1.88
1977	5.00	1.20	0.45	1.01	2.28
1978	5.22	1.24	0.47	1.02	2.42
1979	4.98	1.26	0.49	1.03	2.14
1980	5.05	1.30	0.51	1.04	2.14
1981	4.92	1.21	0.52	1.05	2.09
1982	4.88	1.12	0.52	1.06	2.13
1983	4.93	0.97	0.52	1.07	2.30
1984	5.00	0.89	0.52	1.08	2.45
1985	4.92	0.83	0.52	1.09	2.42
1986	4.96	0.87	0.52	1.10	2.41
1987	4.79	0.91	0.52	1.11	2.20
1988	4.79	0.96	0.51	1.12	2.14
1989	4.63	1.00	0.51	1.13	1.94
1990	4.63	1.11	0.51	1.14	1.82
1991	4.54	1.14	0.50	1.14	1.71
1992	4.32	1.16	0.50	1.13	1.49
1993	4.37	1.20	0.49	1.13	1.51
1994	4.67	1.25	0.48	1.14	1.75
1995	4.43	1.32	0.48	1.13	1.46
1996	4.39	1.38	0.47	1.13	1.37
1997	4.21	1.31	0.46	1.12	1.28
1998	4.01	1.25	0.46	1.12	1.15
1999	3.85	1.20	0.45	1.11	1.06
2000	3.68	1.16	0.45	1.10	0.94
2001	3.60	1.13	0.44	1.09	0.91
2002	3.37	1.09	0.44	1.08	0.73
2003	3.17	1.05	0.43	1.07	0.60
2004	3.14	1.04	0.43	1.06	0.59
2005	3.20	1.05	0.42	1.05	0.65
2006	3.29	1.11	0.42	1.05	0.70
2007	3.31	1.13	0.42	1.05	0.70
2008	3.32	1.16	0.41	1.05	0.69
2009	3.22	1.16	0.41	1.04	0.60
2010	3.32	1.16	0.40	1.04	0.70
2011	3.38	1.19	0.39	1.04	0.73

Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).

Appendix C: Factors contribution to GDP in Kenya, 1961-2011 (% points)

Year	GDP Growth	Contribution from Physical Capital	Contribution from Human Capital	Contribution from Labour	Contribution from TFP
1961	-1.38	-0.62	0.16	0.87	-1.79
1962	3.06	-0.61	0.16	0.88	2.60
1963	2.79	-0.51	0.16	0.89	2.22
1964	4.44	-0.46	0.16	0.89	3.81
1965	4.53	-0.36	0.16	0.90	3.79
1966	5.42	-0.21	0.21	0.90	4.47
1967	5.21	-0.10	0.24	0.91	4.12
1968	4.62	0.07	0.26	0.91	3.33
1969	4.88	0.23	0.28	0.92	3.40
1970	3.55	0.56	0.29	0.92	1.74
1971	3.94	0.81	0.32	0.94	1.83
1972	4.46	0.99	0.35	0.96	2.11
1973	4.21	1.13	0.37	0.97	1.70
1974	4.90	1.24	0.39	0.99	2.24
1975	4.69	1.32	0.40	1.00	1.91
1976	4.58	1.22	0.43	1.01	1.88
1977	5.00	1.20	0.45	1.01	2.28
1978	5.22	1.24	0.47	1.02	2.42
1979	4.98	1.26	0.49	1.03	2.14
1980	5.05	1.30	0.51	1.04	2.14
1981	4.92	1.21	0.52	1.05	2.09
1982	4.88	1.12	0.52	1.06	2.13
1983	4.93	0.97	0.52	1.07	2.30
1984	5.00	0.89	0.52	1.08	2.45
1985	4.92	0.83	0.52	1.09	2.42
1986	4.96	0.87	0.52	1.10	2.41
1987	4.79	0.91	0.52	1.11	2.20
1988	4.79	0.96	0.51	1.12	2.14
1989	4.63	1.00	0.51	1.13	1.94
1990	4.63	1.11	0.51	1.14	1.82
1991	4.54	1.14	0.50	1.14	1.71
1992	4.32	1.16	0.50	1.13	1.49
1993	4.37	1.20	0.49	1.13	1.51
1994	4.67	1.25	0.48	1.14	1.75
1995	4.43	1.32	0.48	1.13	1.46
1996	4.39	1.38	0.47	1.13	1.37
1997	4.21	1.31	0.46	1.12	1.28
1998	4.01	1.25	0.46	1.12	1.15
1999	3.85	1.20	0.45	1.11	1.06
2000	3.68	1.16	0.45	1.10	0.94
2001	3.60	1.13	0.44	1.09	0.91
2002	3.37	1.09	0.44	1.08	0.73
2003	3.17	1.05	0.43	1.07	0.60
2004	3.14	1.04	0.43	1.06	0.59
2005	3.20	1.05	0.42	1.05	0.65
2006	3.29	1.11	0.42	1.05	0.70
2007	3.31	1.13	0.42	1.05	0.70
2008	3.32	1.16	0.41	1.05	0.69
2009	3.22	1.16	0.41	1.04	0.60
2010	3.32	1.16	0.40	1.04	0.70
2011	3.38	1.19	0.39	1.04	0.73

Source: Author's calculations based on equations (3) and (8) and data from PWT (2014).