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THE EFFECT OF GENDER INEQUALITY IN EMPLOYMENT AND EDUCATION ON ECONOMIC GROWTH IN SUB-SAHARAN AFRICA

BY

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DECLARATION

I hereby declare that this submission is my own and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree at the University of Ghana.

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I declare that I have supervised the candidate in undertaking the study herein submitted and I confirm that the candidate has my permission for assessment.

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DEDICATION

In loving memory of my beloved Aunty, Dora Obuor.

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ACRONYMS

UNESCO	United Nations Educational, Scientific and Cultural Organization
UN	United Nations
UPE	Universal Primary Education
FAWE	Forum for African Women Educationalists
ILO	International Labor Organization
AFD	African Development Foundation
SSA	Sub Saharan Africa
MENA	Middle East and North Africa
EAP	Eastern Partner Countries
SDG	Sustainable Development Goals
GMM	Generalized Method of Moments
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
IMF	International Monetary Fund
MDF	Modified Dickey–Fuller
DF	Dickey–Fuller
ADF	Augmented Dickey–Fuller
AR	Autoregressive

FE	Fixed Effect
RE	Random Effect

ABSTRACT

The linkage between gender inequality in education and employment and its impacts on economic growth has not been extensively discussed among scholars in SSA. The primary focus in literature has been based on the role that gender inequality in education plays in influencing economic growth in Sub Saharan Africa. With this, the precise association between education and employment inequality on economic growth need to be investigated empirically in SSA. This study therefore uses a balanced panel data on twenty- eight (28) selected SSA countries to explore the impact of gender inequality in education and employment on economic growth in SSA for the period 2005 to 2017. Employing Two step system-GMM estimation technique together with Pedroni and Kao cointegration tests, this study establishes a long-run relationship among the sample variables used. In addition, the GMM results show that the gap in education influences employment inequality to have a negative impact on economic growth in SSA. As a result, this study suggests that gender inequality in secondary and tertiary education should be of a prime focus in mainstream policy and public dialogue in SSA.

CHAPTER ONE

INTRODUCTION

1.1 Background

The growth of an economy is the yardstick with which countries are measured to be doing well. This growth may arise from several factors, including natural resources, infrastructure or physical capital, population (labour), technology, human capital and other factors. Economic growth and development have been proved in studies to help people move from a low to a respectable level of living (Mulok et al., 2012).

However, education and training for human capital development play a critical role in supporting economic progress and dignity. Since most secondary school graduates enter the labor market in Sub-Saharan Africa, secondary school education is seen as one of the most important determinants for growth and development (Fredriksen & Fossberg, 2014). Through this form of education, young secondary school graduates acquire elementary foundation skills in literacy and numeracy necessary for getting work that can pay enough to meet their daily needs (UNESCO, 2012). Furthermore, according to Al-Samarrai & Bennell (2006), providing relevant skills to the workforce enhances productivity gains, particularly in the informal sector. Therefore, education is often viewed as a critical catalyst for overall individual, community and national development (see, for instance, Sen 2000; Bowles & Gintis, 2003).

The United Nations (UN, 2018) proposes that education is the key that will allow many sustainable development goals to be achieved. When people have access to high-quality of education, they are better informed and equipped, which helps to eliminate gender disparity and break the poverty cycle. In Sub Saharan Africa, employment and education remain significant challenges since most of the masses live in poverty. According to Qiang (2008), poverty leads to gender disparities in

educational access in West African countries. In addition, Qiang (2008) revealed that low-income families in West Africa economies sent their male children to school while leaving their female children at home to help with household chores. Following the independence in Africa, substantial governance failures and coup d'états occurred, resulting in inadequate investment in education, health, infrastructure, jobs, and a variety of social services, and hence, worsening the region's poverty.

In May 1961, African leaders in a meeting in Ethiopia launched the Universal Primary Education (UPE) for all children in Addis Ababa (Shabaya & Konadu-Agyeman, 2004). This event led to the implementation of free compulsory education by some countries like Ghana, Nigeria, Liberia, Zambia, Kenya, Tanzania and Uganda in the 1960s. Although, UPE program has improved school attendance at the primary level in many countries, in the 1960s and 1970s, girl child education continued to lag behind boys in Africa compared to other regions of the developing world (Shabaya & Konadu-Agyeman, 2004). Adedeji (1990) reported that many African countries were faced with severe financial problems which affected their ability to allocate resources for the UPE program.

The failure of this policy led to another meeting in Dakar in the 2000s to establish a new framework to achieve adult literacy by 50% for women and eradicate gender inequality in primary and secondary school by 2015 (FAWE, 2000). These strategies were crucial, and member countries followed them to bridge the gender inequality gap in education. Although these strategies and policies have brought some success in closing the gender gap in education, inequality in education continues to be a significant problem in Sub-Saharan Africa.

According to the International Labor Organization (2018), 61% of the global employed population earn their living in the informal sector, with 39% occupying the formal sector. In Sub-Saharan

Africa, in terms of employment, the informal sector accounts for 70% of employment whilst the formal sector accounts for only 30% (AFD, 2013). The informal sector in Sub-Saharan Africa provides the largest share of economic opportunity for both men and women and is highly dominated by agricultural activities, with most women occupying the sector. According to Malta et al. (2019), women work relatively more in the informal sector in Sub-Saharan Africa than men due to certain factors such as women's lower education levels, lower skills acquisition, legal barriers and social norms.

As a result of these aforementioned factors, women in SSA earn significantly less than males. Between the ages of 15 and 64, the overall labor force participation rate in SSA is 62.79% for females and 74.03% for males, respectively (ILO, 2019). Furthermore, the male labour participation rate in Sub-Saharan Africa was recorded at 72.32% in 2021, whereas the female participation rate was around 11 percent lower than the male rate. Lower female labor force participation in developing nations, according to Klasen (2017), can be ascribed to other household income. In addition, Klasen (2017) found that many women in developing countries, particularly the poor, are hesitant to join the labor force, and that these poorer women work when it is necessary but withdraw their labor service when it is cheap. Most evidence shows that women's employment and income influence their bargaining power, well-being, and children (World Bank, 2001; Thomas, 1997; King et al., 2009; Majlesi, 2016). Although female labor force participation is rising in developing countries across the globe, the growth of female labor force participation in developing countries has, on average, not been very large (Klasen, 2017). It should be noted that gender inequality in employment leads to a reduction in the pool of talent available in the economy and this distorts the allocation of talents across different occupations and hence economic growth.

1.2 Problem Statement

Considering the recent global economic downturn for which SSA economies are not an exception, stringent measures to promote sound and sustained growth is becoming imperative in the policy front of most economies around the world. Broadly speaking, Sub-Saharan Africa (SSA) is notably known as a region endowed with growth- enhancing resources such as minerals, arable land, oil and others (Erdogan et al., 2021). Despites these minerals, the region continue to be plagued with acute poverty, slow economic growth, and widening socioeconomic disparities (Qiang, 2014; Klasen & Lamanna, 2009). It is revealed that real GDP per capita growth in SSA for the period 1990 to 2014 peaked at only 0.8% compared with 2.2% and 2.9% in MENA[1] and EAP[2] countries (Ngotho, 2016). In 2020 alone, economic activity in SSA was projected to drop by approximately 5% per capita. In addition, during the same time period, economic growth in East and Southern economies also shrank by roughly 3% per capita (Sulemana & Dramani, 2020).

Given these consequences, education and employment are regarded as most essential factors in addressing low economic performance in SSA (Qiang et al., 2008). This is because, education offers the basic skills and knowledge that equip the youths in the attainment of decent jobs, thereby improving their well-being and promoting economic progress (Levine, 2004). This notwithstanding, gender inequality in education has been a major concern for all countries around the world for which SSA region is no exception (Baliamoune-Lutz, 2007). According to Klasen (2002), gender disparities in education have both direct and indirect implications on economic growth. For example, lower level of education has a negative impact on the average level of human capital and hence economic growth. That is, lower level of education, particularly among females

[1] Middle East and North Africa
[2] Eastern Partner Countries

in developing economies raises infant mortality, reduces family health and life expectancy, degrades the quantity and quality of children's educational attainment, and in the longer extent impacts negatively on economic growth.

Concerning employment and education inequalities in SSA, it is worth mentioning that women still remain underrepresented in the crucial growth-enhancing professions like science, technology, engineering, and mathematics, despite the significant policies towards bridging the gap between gender inequality in employment and education in SSA (World Economic Forum report, 2020). According to the World Bank (2011) report, women continue to be segregated in low-wage occupations, work as unpaid household workers, and constitute the majority of workers in the informal sector. In addition, the recent World Economic Forum Report (2021) posits that, there is still gender disparity in education regarding literacy and primary and secondary school enrollment in Sub-Saharan Africa. For instance, in Chad, only 14% of women are literate relative to 31.3% of men, and in Guinea, 22% of women are literate compared to 43.6% of men. Also, in Nigeria, 69.9% of boys enrolled in primary school, while girls are 58.1%.

From what is expounded above, one source of concern points to the fact that technological improvements are now transforming the world of work and blurring the borders between physical and digital work environments. For example, the current COVID-19 outbreak has increased digital penetration and shifted the majority of commercial activity online (Apergis & Apergis, 2021). Almost every industry has seen substantial changes in the production processes, management, and governance around the world. Enterprises are now looking for more efficient and effective ways of producing goods, and the growing preference for automation over labor is jeopardizing the livelihoods of many workers. This implies that a significant number of workers who have little or no technical know-how would be laid off from their post, and this would escalate the

unemployment situation faced in SSA. Undeniably, according to Klasen & Lamanna (2009), gender disparities in education has caused a substantial number of people in SSA to have little or no technical know-how and that majority of workers that have little or no technical know-how are more likely to be pushed into the poverty zone as the world of work evolve.

Given the high levels of gender disparities in education and employment, and its associated challenges in SSA, no doubt researchers and policy think tanks are interested in unravelling the consequences of these disparities on economic growth in SSA (Klasen & Lamanna, 2009; Chaudhry & Rahman, 2009; Wang & Liu, 2016).

From what has been indicated above, the detrimental impact of these pre-existing inequalities in SSA indicate the widening and deepening of citizen's socioeconomic woes as technology advances. As a result, if caution is not exercised, the negative consequences of gender imbalance in education and employment would exacerbate the SSA economies growth crisis. However, empirical evidence on how education and employment inequality can affect economic growth is dominated with data from developed and emerging economies (Klasen & Lamanna 2009; Klasen & Santos Silva, 2018; Rodríguez, 2018; Klasen & Minasyan, 2017), research in the literature especially in the less developed nations like SSA is missing. Hence, it is imperative to investigate the impact of gender inequality in education and employment on economic growth in SSA.

In doing so, this study contributes to the extant literature in three ways. First, this study examines whether inequality in education complements employment inequality to maximize economic growth in Sub-Saharan Africa. It is acknowledged that past studies (Klasen & Lamanna, 2009; Chaudhry & Rahman, 2009) have analyzed the separate effect of gender inequality in education and employment on economic growth in SSA. However, a study by Yumusak et al. (2013)

indicates that an increase in level of education is primarily an effect to citizens' participation rate to labor force and that effective use of the labor factor leads to higher level of production and economic growth. Also, because gender inequality in education simply results in inequality in employment, which consequently affects growth, it is important to see how education inequality complements employment inequality to affect economic growth in SSA. However, studies on SSA have overlooked how education inequality could complement employment inequality to affect economic growth in SSA. Second, this study will also test whether economic growth in SSA converges or diverges. Finally, the current study uses a panel data set that takes advantage of the time series and cross-sectional aspects of the data. Panel data set bring in additional variation and increases the efficiency of the estimates. The findings of this study will thus be more robust than time series and cross section results.

1.3 Research Questions of the Study

This study seeks to find an empirical response to the following questions.

1. Does gender inequality in employment affect economic growth in SSA?
2. Does gender inequality in education affect economic growth in SSA?
3. What is the complementary impact of gender inequality in education and employment on economic growth in SSA?
4. Does economic growth converge in SSA?

1.4 Objectives of the Study

The main objectives of the study are to;

1. To examine the effect of gender inequality in employment on economic growth in SSA.

2. To estimate the effects of gender inequality in education on economic growth in SSA.
3. To assess the complementary impact of gender inequality in education and employment on economic growth in SSA.
4. To test whether economic growth in SSA converges or diverges.

1.5 Significance of the Study

This study examines the effect of gender inequality in employment and education on economic growth in SSA region. In Sub-Saharan Africa, promoting gender equality and empowering women is perhaps the most important among the seventeen (17) Sustainable Development Goals (SDGs) adopted by all United Nations Member States in 2015, called the Agenda 2030 in building peaceful, just and inclusive societies. The outcome of this study would serve as a guide for gold managers of the economy to appreciate the varied effect of employment and education inequality on SSA economic growth so as to realign their decisions towards bridging the gap between employment and education in SSA.

1.6 Organization of the Study

This study is organized into five chapters. The chapter one throws light on the overview of the subject matter which comprises the background, problem statement, research objectives, research questions, significance and the organization of the study. The review of relevant theoretical and empirical literature is also discussed under chapter two. Chapter three focuses on the methodological framework this study employed. It discusses the theoretical and empirical model specification, data sources and methods used in analyzing the data. The chapter four discusses the results obtain from the empirical investigations and the last chapter provides the summary of the main findings, conclusions and recommendation.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of literature relevant to this study. The chapter is divided into two major sections. The first presents theoretical literature based on conceptual issues and the theories that explain gender inequality in education and employment on economic growth. The last section presents the empirical literature relevant to this study and ends with a summary on the progress in linking the theoretical and empirical literature.

2.1 Theoretical Literature Review

This section of the study is divided into four main sub-sections. The section one discusses the theories that link gender inequality to economic growth. The section two also reveals theories on how economic growth can affect gender inequality. The section three points on the theories that relate how economic growth can effect gender inequality and the vice versa.

2.2 Effects of Gender Inequality on Economic Growth

The influx of literature on gender inequality in education and employment have shown that gender inequality reduces economic performance and hence growth. The World Bank (2001) reported that gender inequality does not only reduce the well-being of women, but also reduces that of men and children and hence harms economic growth. Thus, mother's lack of schooling reduces female human capital and leads to poor quality of care for children. This sub-section discusses the various channels through which gender gaps affect economic growth.

2.2.1 The talent reduction channel

In a model proposed by Esteve-Volart (2009), gender inequality in employment leads to a reduction in the pool of talent available in the economy and this distorts the allocation of talents

across different occupations. In this model, agents are born with random endowments of entrepreneurial talent and they choose how much human capital to acquire and whether to become managers or workers. If women are excluded from managerial positions, equilibrium wages and human capital investment for both male and female workers are reduced, as is the average talent of managers. Lower talent then results in less innovation and slower adoption of technology, both of which reduce aggregate output. On the other hand, if women are completely excluded from the labor force, aggregate productivity and gross domestic product per capita are lower because they can only use their talent to engage in home production.

2.2.2 The wage discrimination channel

Cavalcanti & Tavares (2008), proposed a framework to quantify the aggregate effects of gender inequality in wages. In particular, they introduced wage discrimination against women into a growth model with endogenous saving, fertility and labor market participation. They calibrated their model using US data and found very large effects of these wage gaps, a 50 percent increase in the gender wage gap led to a decrease in income per capita of a quarter of the original output. Their results also suggested that a large fraction of the actual difference in output per capita between the US and other countries was indeed generated by the presence of gender inequality in wages.

2.2.3 The talent allocation channel

Cuberes & Teignier (2012) quantified the effects of gender inequality in the labor market using a model of talent allocation based on a span-of-control by Lucas (1978). In their setup, agents are endowed with a managerial talent drawn from a fixed distribution. The most talented individuals choose to become firm managers, whereas the rest are employed as workers. Gender inequality was then introduced as an exogenous restriction to women's access to managerial positions or to

their participation in the labor force. The model predicted that gender gaps in access to managerial positions led to a decrease in the average talent of managers, which reduced aggregate productivity, whereas gender gaps in labor force participation led to a fall in income per capita. Based on the model, if all women were excluded from managerial positions, output per worker would decrease by about 12%. More so, if all women were excluded from the labor force, the loss in income per capita would be 40%. In a country-by-country analysis, they found that, gender gaps and their implied income losses were quite similar across income groups but differed importantly across geographical regions, with a total income loss of 27% in Middle East and North Africa and a 14% loss in Europe and Central Asia.

2.2.4 Occupational choice model

Lastly, occupational choice model propounded by Hsieh et al. (2012) is based on the principle of comparative advantage to explain the labor market gap between Whites and Blacks in the United States. In their model, every individual chooses the occupation where he/she earns the highest wage. They distinguished between two models, one in which occupational frictions are generated, for instance, by differences in human capital across different population groups, and another one in which these frictions could be interpreted as discrimination taxes on members of a given group. Whereas the former model produces an efficient outcome, in the latter, there existed misallocation of talent, and so a decrease in the wage gap introduced by discrimination or a reallocation of workers across occupations would improve efficiency. The authors' further used US Census data to match the different equilibrium conditions generated by their model and estimated the implied occupational wage, frictions and human capital gaps by group. This information was then, in turn, used to infer the productivity gains associated with changing these gender gaps. Their results suggested that changes in the labor force and occupations of black men and women with respect

to their white counterparts could explain between 17% and 20% of the output growth during the 1960-2008 period.

2.3 Effects of Economic Growth on Gender Inequality

This section discusses how an increase in economic growth may cause gender inequality to reduce, with much focus on the labor force participation gender gap. Theoretically, the main channels through which an increase in a country's income reduces gender gap include the income elasticity channel, technological growth channel, the children's education channel, the service sector channel, and the property rights channel.

2.3.1 The income elasticity channel

Becker & Lewis (1973) on the effects of economic development on female labor force participation argued that the income elasticity with respect to investment in children's education is much higher than that with respect to the number of children in a family. As a result, an increase in income to some extent or threshold may lead to a fall in fertility with a corresponding increase in investment in the human capital of each child. At the macro level, once a country reaches a certain income benchmark, total fertility declines causing an increase in the amount of resources to be spent on each child's education. This decline in fertility serves as a means to spark women's involvement in the labor market, and as such reduces gender inequality in labor force participation.

2.3.2 Technological growth channel

According to Greenwood et al. (2005), technological progress to the introduction of labor-saving consumer durables which includes refrigerators, washing machines, vacuum cleaners, etc. creates avenues for women to increase their participation in the labor market rather than being confined

to home production. In this model, they argued that households derive utility from the consumption of non-market goods, which are produced using household capital and labor. Technological change in capital goods on the other hand was assumed to reduce the relative price of these household durables thereby encouraging its adoption. The argument here is that, using more productive appliances frees up time formerly devoted to housework and hence allows women to increase their involvement in the formal labor market and hence reduces gender gaps.

2.3.3 The children's education channel

Doepke & Tertilt (2009) in their model argued that men have the power to choose women's legal rights, but with a tradeoff. Husbands were perceived to have granted fewer rights to their wives in order to maintain their bargaining power in the household. In this model, an increase in the bargaining power of wives were seen to impact negatively on husband's utility since husbands valued their own consumption more than their wives. As such, husbands were assumed to care less about their children's well-being than their wives. Husbands on the other hand were assumed to be in favor of expanding other women's rights basically because they are altruistic toward their own children. They want their daughters to enjoy higher rights even as this gives them more utility and they as well benefit from the fact that their male children are able to find wives with legal rights which is assumed to be proportional to higher human capital in their model because higher legal rights of women increase their children's and grandchildren's education. When the returns to education are low, men vote for a patriarchal political regime, in which all family decisions are made solely by the husband. Eventually, though, technological progress changes the importance of human capital and leads to a shift in the tradeoff between the rights of a man's wife and those of his daughters. Once returns to education reach a critical threshold, men end up voting for a political regime of empowerment, under which decisions are made jointly by husband and wife.

In conclusion, this theory explains why the legal and economic rights of married women improve before their political rights do so.

2.3.4 The service sector channel

Ngai & Petrongolo (2013) in their model explained how important an increase in the service sector has reduced gender gaps in wages and market hours in recent decades in the US. They assumed that women have comparative advantage in the service sector, hence whenever any structural transformation which is associated with economic growth led to expansion of the service sector, the outcome was gender-biased shift in labor demand in favor of women. Thus, increase in service sector increased women participation in the labor market and hence reduced gender gaps. This model therefore predicted that the rise in the service sector accounted for 44% of the increase in female market hours and 11% decrease in that of males.

2.3.5 The property rights channel

According to Geddes & Lueck (2002), the expansion of women's rights is associated with economic growth using a property-rights analysis. They argued that if men and women were to have equal rights, marriage would be a shared contract and both will be able to contract fully inside and outside the marriage. On the other hand, if women have no rights, the marriage becomes a principal-agent system in which the man legally owns the wife and her flow of value. In their model, because property rights are not perfect and there are transaction costs within the family, it is difficult for men to generate the incentives for efficient investment and use of women's human capital. As such, since economic growth leads to greater gains from human-capital investment, men are eventually interested in granting women equal rights.

2.4 Causal links between Gender Inequality and Economic Growth

2.4.1 The fertility channel

Galor & Weil (1996) confirms that gender inequality and economic growth simultaneously affect each other. According to this theory by Galor & Weil (1996), economic growth generates a feedback on gender inequality by reducing fertility, which leads to a demographic transition (the process which a country's fertility undergoes an irreversible decline) and faster output growth. The production side of this theory is modelled to include two inputs which are physical strength and mental capabilities. Men are endowed with more physical strength than women, but both sexes have the same endowment of mental input. However, women were assumed to be more complementary to physical capital than men. This implies that women have a comparative advantage in the mental labor input, as such the increase in capital intensity that accompanies economic growth raises the relative wage of women. Assuming that the income effect associated with this higher wage is lower than the substitution effect, this rise in women's relative wage lowers the fertility rate because it induces women to switch from childrearing to participating in the labor market. Finally, higher wages and lower population growth lead to higher levels of capital per worker and hence faster output growth.

2.4.2 The human capital channel

More so, according to Lagerlöf (2003), gender gap in education increases economic growth through its effects on fertility and on the human capital of children. He presented a model in which families play a coordination game against each other when deciding the human capital level of their offspring. In the model, although two sexes were modelled as being symmetric in terms of talent, gender discrimination arose as Nash equilibrium. Furthermore, he assumed that if everybody expected families to behave in a discriminatory manner by educating their sons more

than their daughters, it was optimal for parents to also do so, because daughters will then marry more educated men who would earn higher incomes. As economies reco-ordinated towards a more 'gender-equal' equilibrium, women's human capital increased and their time became more expensive, which then led families to substitute quality for quantity in children. This eventually led to a higher stock of human capital and hence faster economic growth. As economies became richer enough, the substitution effect generated by a rise in income was larger than the income effect and so the quality-quantity substitution was reinforced, hence generating a virtuous growth process.

2.5 Empirical Literature Review

On the empirical front, studies on the effect of education and employment inequality on economic growth point to the fact that inequality dampens economic growth. For instance, Klasen (2002) assessed how gender inequality in education affects long term economic growth using cross-country analysis and panel regressions for the period 1960 to 1992 in SSA, South Asia, Middle East and North Africa. In the study, female to male ratio of total years of schooling was used to capture gender inequality in education. The results obtained from the panel regressions showed that gender female to male ratio of total years of schooling significantly reduces GDP per capita by lowering average human capital. The study further revealed that, growth in SSA is indirectly affected by investment and population growth.

Similarly, Baliamoune & McGillivray (2007) investigated the impact of gender inequality in education on economic growth in Sub-Saharan Africa and Arab countries for the period 1970 to 2000 by employing the System GMM estimation technique. In this study, Baliamoune & McGillivray (2007) used two proxies to measure gender inequality in education, namely: the ratio

of girls to boys in primary and secondary education enrollment and the ratio of 15 to 24 year-old literate females to males. Applying fixed and random effect estimation techniques, this study revealed that the ratio of girls to boys in primary and secondary education enrollment and the ratio in literacy has a negative significant effect on growth. Also, this study further demonstrated that gender inequalities in primary and secondary school enrollments were less robust but with statistical evidence that female education increases growth in the Arab countries.

Employing cross sectional data and panel regressions estimation techniques, Klasen & Lamanna (2003) also examined the impact of gender inequality in education and employment on economic growth in the Middle East and North Africa from 1960 to 2000. Klasen & Lamanna (2003) documents that inequality in education and employment measured by initial female to male ratio of years of schooling and female share of the labor force, respectively have a negative significant effect on economic growth in MENA economies. Given this, Klasen & Lamanna (2003) concluded that gender gaps in education and employment are not only an inequality issue rather it is also a growth issue.

Turning to the study by Klasen & Lamanna (2009), who applied cross-country data and panel regressions to investigate the extent to which gender inequality in education and employment affect economic growth in Middle East, North Africa and South Asia for the period 1960 to 2000, Klasen & Lamanna (2009) found that gender gaps in education and education dwindles economic growth drastically. In their study, education and employment inequalities were measured by female to male ratio of schooling, female to male ratio of the growth in the years of schooling, female to male ratio of activity rates, and female share of the total labor force, respectively.

In Tunisia, Karoui & Feki (2018) examined the impact of gender inequality in education on economic growth by employing a time series data spanning from 1970 to 2009. The study

considered educational inequality indicators such as girls among all primary school graduates per year, rate of girls among all high school graduates by year, and rate of girls among all university graduates per year. Their findings showed that gender inequality in education negatively affects intellectual environment, the skill of children and the quality of students. As a result, productivity and economic growth were adversely affected. Further results indicated that gender inequality in recruitment with qualification into the workforce decreased economic growth. More so, gender equality at the level of education was found to increase the level of education of women and hence growth.

Gelard & Abdi (2016) on the effects of gender inequality in life expectancy and disparity in wages on economic growth in countries with high human development index, Gelard & Abdi (2016) applied a complete balanced panel data and Two-step GMM for the period 2002 to 2012. They found that a decrease in gender inequality in all facets in relation to education, employment, labor market, cultural issues, wage issues and full equality in society increased economic growth in countries with high human development indexes. Hence, an increase in the equality of women and men in all areas would have the capacity to elevate economic growth. Further, the results indicated that inequality in life expectancy and disparities in wages decreased economic growth over the sample period.

In Pakistan, Chaudhry (2007) assessed empirically the impact of gender inequality in education (using proxies such as overall literacy rate, the ratio of literate females to males aged 10 years and above, and the ratio of enrolment rates of females to males at primary level) on economic growth for the period 1970 to 2005. The estimated results were achieved using multivariate regressions based on OLS. The findings showed that increases in the overall literacy rate, the ratio of literate females to males aged at least 10 years and the ratio of enrolments rates of females to males at the

primary school level increased economic growth significantly. In addition, literacy rate, public expenditure on education, and labor force growth were found to also increase economic growth. The results also indicated that increases in the ratio of female to male participation in the workforce increased economic growth significantly. With this, the study concluded that increasing female employment was found to impact positively on economic growth in Pakistan over the sample period.

In Pakistan again, Ali (2015) discussed the effect of gender inequality on economic growth from 1980 to 2009 by using a multiple linear regressions based on OLS. In this study, gender inequalities were measured by ratio of female to male in education both primary and secondary enrollment and labor force participation of females and males aged 15 years and above. The findings from the study indicated that gender equality in education and employment led to higher economic growth in Pakistan over the sampled period. This is evident from the fact that all the variables included in model such as labor force participation rate of males aged above 15 years, labor force participation rate of females aged above 15 years, gender parity index, openness of trade, exports and imports impacted positively on economic growth in Pakistan over the sample period.

Seguino (2000) also discussed the effect of gender inequality in education and labor markets (using proxies such as the level of female human capital and the level of male human capital) on economic growth using cross-country analysis from 1975 to 1995. The results were estimated using a two-way error component model. The findings showed that gender wage inequality increased economic growth in the sample period, a clear contrast to recent works which have proven that income inequality reduces economic growth. Additional result also indicated that portion of the impact of gender wage inequality on growth was transmitted through its positive effect on investment as a share of GDP.

Pervaiz et al. (2011) assessed the impact of gender inequality (using three sub-composite indices such as educational index of gender, gender labor participation index, and survival index) on economic growth in Pakistan using data for the period 1972 to 2009. The estimations were made using the Vector Error Correction Model. Results from the estimations indicated that trade openness, labor force growth and investment increases economic growth significantly. Gender inequality on the other hand was found to decrease economic growth significantly in Pakistan over the sample period.

Chaudhry & Rahman (2009) analyzed the impact of gender inequality in education (using proxies such as female-male enrolment ratio, female-male literacy ratio, Female-male ratio of total years of schooling, female- male ratio of earners and education of household head) on rural poverty in Pakistan using primary data sets from November to December, 2008. The estimation methodology used was the Logit regression. The findings revealed that gender inequality in education negatively affected rural poverty over the sample period. Further results indicated that, the female-male enrollment ratio, female-male literacy ratio, female-male ratio of total years of schooling, female-male ratio of earners and education of household heads significantly affected rural poverty in a negative way. This finding implies that education provides more employment avenues and reduces poverty in Pakistan.

Ahang (2014) generally assessed the impact of gender inequality in education and health (using measures such as the average years of female labor force education with tertiary education and the average years of experience of Female Labor force with tertiary education) on economic growth in developed countries for the period 2006 to 2012. The estimation technique used was Pooled Exponential Generalized Least Squares (cross-section weights). The results showed that the factor

of experience, which was a measure of index of social capital among women, decreased economic growth. However, human capital of females increased economic growth in the sample period.

Kim et al. (2016) attempted to investigate a model of gender inequality (focusing on measures such as women's time allocation among market production, home production, child rearing, and child education) and economic growth in Asian economies using macro level data for the period 2005 to 2010. The results from their analysis indicated that decreasing gender inequality has the potential to contribute significantly to economic growth by altering females' time allocation and promoting the accumulation of human capital. Further results indicated that removing gender inequality increased income in the sample period above the benchmark in the economy after one or two generations.

Klasen & Minasyan (2017) examined the mechanisms through which gender inequality in education and employment (using proxies such as gaps in primary, secondary and tertiary education and labor force participation) affect economic growth in the Europe using data from 1970 to 2000. Using descriptive statistics, they found that there were basically no gender gaps in primary and secondary education (due to free, compulsory schooling laws) in the EU, while at the tertiary level, gender gaps actually favored females. They also found that gender gaps in labor force participation and employment (to the detriment of females) were highly substantial in Europe. In all, they concluded that gender inequality in education and employment lowered economic growth in Europe. More importantly, their finding showed that in Europe, only gender gaps in labor force participation are relevant for economic growth.

Kim et al. (2018) analyzed the impact of gender inequality in employment (considering measures such as female and male labor market participation and human capital accumulation, wife to husband ratio of child rearing as well as wife-husband ratio of child education) on economic growth in Korea from 2005 to 2010. Using quantitative analysis, they found that if gender inequality was completely eliminated, the female labor force participation rate increased from 54.4 to 67.5%, and the annual per capita income growth rose from 3.6 to 4.1% on average over a generation. Further results indicated that gender equality policies that increased the time spent by a father on child rearing contributed positively to female labor market participation and per capita income growth.

Klasen (2018) investigated the effects of gender inequality in education and employment (using proxies such as female-male ratio of gross secondary school enrolment rates and female labor force participation rate) on economic performance in developing countries from 1970 to 2014. Using country specific fixed effects, the study found that gender gaps in education and employment reduced economic growth over the sample period.

Kim et al. (2016) introduced a model of gender inequality and economic growth that focused on the determination of women's time allocation among market production, home production, child rearing, and child education in Asian economies using data from 2005 to 2010. Their findings showed that improving gender equality can contribute significantly to economic growth by changing females' time allocation and promoting accumulation of human capital. They also found that if gender inequality was completely removed, aggregate income would be about 6.6% and 14.5% higher than the benchmark in the economy after one and two generations, respectively, while corresponding per capita income will be higher by 30.6% and 71.1% in the hypothetical gender-equality economy.

Altuzarra et al. (2021) empirically examined the effects of various dimensions of gender inequalities (education, labor market and institutional representation) on economic growth in SSA, Southeast Asia (SA), Middle East (MENA), Latin America and the Caribbean (LAC) and East Asia and Pacific (EAP) from 1990 to 2017. Using a Generalized Method of Moment model, the results suggested that gender equality in education contributed to economic growth and this is a common feature in developing countries. The contribution of equality in education to growth seems to be greater in the SSA countries than in the entire sample of developing countries. The female–male ratio of labor market participation was not statistically significant. They also found a significant link between the presence of women in parliaments and growth in the sample of all developing countries, while this relationship was negative for the SSA countries.

2.3 Summary of Empirical Literature

The theoretical and empirical literature reviewed points to the fact that gender inequality reduces economic performance and hence economic growth. The theoretical and empirical literature are in harmony indicating that improving gender equality potentially contributes to economic growth by increasing females' time allocation and promoting human capital. Hence reducing gender inequality will increase economic performance and growth in economies.

Considering the fact that gender inequality is very high in SSA with few corresponding works, it is very imperative that more light is thrown on the subject matter to elevate its true impact on economic performance so as to harness its positive impact in the region, hence the need for this current study.

CHAPTER THREE

METHODOLOGICAL FRAMEWORK

3.0 Introduction

This chapter of the study outlines the methodological approach the study uses to analyze the dataset. It is divided into five sub-sections. The theoretical and empirical model specifications are presented in the first section. The next section of this chapter identifies the source of the data on the variables used. This is followed by a brief description of the sample variables and their expected signs. The fifth section of this chapter contains the estimation strategy and the diagnostic test procedures whereas the last section describes the stationarity tests the study applies to determine the order of integration of the sample variables.

3.1 Theoretical Framework and Empirical Model Specification

This study modifies the AK endogenous growth model and the Cobb-Douglas production function (CDPF) to ascertain the influence of gender inequality in education and employment on economic growth in SSA. According to Romer (1986), Lucas (1988), and Grossman & Helpman (1990), the endogenous growth model explains how economies increase their growth through education, investment in human capital, knowledge and subsidies for research and development. However, this particular study adapts and modifies the aforementioned model to capture the role that education and employment inequality play in SSA's growth path. Hence, the Cobb- Douglas production function is presented in equation (1) as;

$$Y = AI^{a}L^{\beta} \quad (1)$$

where Y, A, K and L denote economic output, technological progress, capital stock and labor force or employment inequality, respectively. This study expresses Equation (2) by taking the natural logarithm of equation (1) as specified below;

$$lnY = lnA + alnI + \beta lnL \quad (2)$$

Y, A, I and L are already defined. a and β represent elasticities of economic output with respect to capital and labor, respectively. It is worth noting that A refers to total factor productivity increase, which is considered to be unaffected by investment or employment inequality in Equation (2). Hence, following Doudu & Baidoo (2020), who assumed that other economic factors like quality of institutions, financial development, exchange rate and inflation influence technological progress in Ghana. This study assumes that inequality in education, institutional quality, financial development, foreign direct investment and trade openness influence economic growth in SSA through total factor productivity [ie., $A = f(IEDU, IQ, FDI, TO)$]. Hence, Equation (2) is then rewritten as;

$$lnY = lnIEDU + lnIQ + lnFDI + lnTO + alnI + \beta lnL \quad (3)$$

It must be noted that Y, I and L are already defined in the previous equations. IEDU, IQ, FDI and TO denote inequality in education, institutional quality, foreign direct investment and trade openness, respectively.

To ascertain the complementary effect of education and employment inequality on economic growth, this study extends equation (3) to capture the interaction between education and employment inequality as specified in equation (4)

$$Y = f(IEDU, IQ, FDI, TO, I, L, \ L * IEDU) \quad (4)$$

where all the variables in equation (4) are already defined in the previous equations. L*IEDU indicates the interaction term between employment and education inequality, which captures the combined effect of employment and education inequality on economic growth in SSA. The interaction term between employment and education inequality in Equation (4) will help this study achieve its objective 3[3].

This study therefore transforms Equation (4) into its panel estimable form as specified in equation (5) as follows;

$$lnY_{it} = \gamma_{0i} + \beta_1 lnEDU_{it} + \beta_2 lnIQ_{it} + +\beta_3 lnFDI_{it} + \beta_4 lnTO_{it} + \beta_5 lnI_{it} + \beta_6 lnL_{it} + \beta_7 (lnL * lnEDU) + \varepsilon_{it} \quad (5)$$

It must be emphasized that all the variables in equation (5) are already explained. β_1, β_2, β_3, ..., β_7 are the unknown parameters to be estimated, and ε is the stochastic error term assume to be normally distributed with zero mean and constant variance [$\varepsilon_{it} \sim N(0,1)$]. Also, γ_0, ln, t and i indicate the unobserved country- specific heterogeneity, natural logarithm, time trend and the number of countries respectively.

3.2 Data Description

This study concentrates solely on secondary source of balanced panel data on twenty- eight (28) selected SSA countries[4] spanning from 2005 to 2017. It is worth noting that the choice of the study period and 28 selected SSA countries are based on consistency and easily accessibility of data on the main variables (Employment and education inequalities). Data for this study are gleaned from World Bank's Development indicators, Worldwide Governance Indicators Database, International Labor Organization (ILO, 2003) and Barro & Lee (2000). Specifically, data on employment and

[3] Assessing the complementary effect of employment and education inequality on economic growth in SSA

[4] Angola, Burkina Faso, Burundi, Cape Verde, Cameroon, Central African Rep., Chad, Congo Dem. Rep., Congo Rep., Cote d'Ivoire, Ethiopia, The Gambia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Sierra Leone, Tanzania, Togo and Uganda.

education inequality are gleaned from International Labor Organization (ILO, 2003) and Barro & Lee (2000) respectively. Also, institutional quality data is sourced from Worldwide Governance Indicators Database. Whereas, data on the rest of the sample variables are extracted from the World Bank's Development indicators (World Bank, 2020). Furthermore, this study adopted the interpolation method by Sacchi et al. (1998) to fill in the missing values created in the data.

3.3 Description of Variables and Their Expected Signs

This section presents the description of variables used in this study and their expected signs.

Dependent Variables

Economic growth

Economic growth is defined in this study as a proportionate change in a country's output from one period to another. With this regard, an increase in a country's output reflects more income in the economy and hence, increases the willingness of a country to devote some proportion of its income to savings. Given this, economic growth serves as a metric used by governments, policymakers, and researchers to assess an economy's performance in comparison to other economies (Ackon, 2019). In this study, economic growth is measured by GDP growth (annual %) (see: Klasen & Lamanna, 2009; Ngotho, 2016; Duodu & Baidoo, 2020).

Independent Variables

Inequality in Education (IEDU)

This study has used one of the measurements Klasen, (2002) adopted to measure gender bias in education in SSA. According to Klasen, (2002), there is no accurate measure for education

inequality. As a result, he proxy's education inequality with three indicators namely: female to male ratio of total years of schooling of the adult population, average annual absolute growth in total years of schooling and the female to male ratio of the average annual absolute growth in total years of schooling. To be consistent, this study measured education inequality with the female to male ratio of the average annual absolute growth in total years of schooling (see: Klasen, 2002). Education inequality is viewed in this study to have a negative impact on economic growth since inequality in education has been shown to diminish the average number of human capital and limiting the pool of talent from which education is drawn by removing or restricting highly qualified individuals who have the capabilities to contribute to economic growth.

Institutional Quality (IQ)

Institutional quality captures the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development (Sulemana & Bosco Dramani, 2020). Institutional quality has long been acknowledged as a significant factor in determining how economic agents interact (North, 1990). The legal, political, and supervisory entities that create cohesion and order in commercial activity are made up of these institutions. The quality of institutions is expected to relate positively to economic growth in this study since well-functioning institutions seek to lower corruption and provide a friendly business environment for the private sector to operate optimally in the economy. This study however, measure institutional quality with regulatory quality from Worldwide Governance Indicators, which captures the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector.

Foreign direct investment (FDI)

According to the International Monetary Fund (2004), foreign direct investment is defined as an investment made to acquire a long-term interest in a company that operates in a country other than the investor's own. As a result of trade liberalization, most established enterprises tend to purchase or build new businesses in other countries in order to expand their market. Despite the advantages gained by foreign investors, foreign direct investment also generates jobs, import substitution, technology transfer, and revenues in the host country. With this, FDI is expected to have a positive effect on economic growth. Net FDI inflows as a percentage of GDP will be used to measure FDI in this study.

Trade Openness (TO)

Trade openness is the sum of imports and exports expressed as a percentage of GDP. The literature has demonstrated that an economy's openness has a beneficial influence on growth (Blanco, 2013; Gazdar & Cherif, 2015; Duodu & Baidoo, 2021). This is true for countries with the ability to export more since it generates the required foreign currency and employment in the export industry, which in turn encourages long-term economic growth. With this, trade openness is expected to relate positively to economic growth.

Investment (I)

Investment refers to the machinery, tools and buildings used in the production of goods and services in an economy. This could take the form of computers, buildings, vehicles etc and are used differently based on the kind of labor and the work required. The amount of capital accumulation in an economy determines its level of growth. The availability of high quality capital

and its proper utilization impacts positively on growth of an economy. The rate of economic growth is directly related to the availability of capital and technology in the country. Following this, this study expects capital stock to relate positively to economic growth in SSA. Gross fixed capital formation as a percent of GDP is used to proxy for investment in this study.

Labour or Employment Inequality (L)

Labour or employment inequality refers to the gap or disparities that exist between male and female in the workplace in terms of participation rate or wages rate. Evidence shows that employment inequality restricts the pool of talent from which employers can choose and therefore, it limitation lowers the average capability of the workforce. Hence, employment inequality is expected to relate negatively to economic growth in this study. This study employs ratio of female to male labor force (15-64 years) participation rate to proxy for employment inequality (see: Klasen & Lamanna, 2009).

3.4 Estimation Strategy

This section of the study provides detailed steps on how the study achieves its objectives.

3.4.1 Cross Sectional Dependency Test

According to Hoyos & Sarafidis (2006), panel datasets are more likely to exhibit cross-sectional dependencies in the errors, due to the presence of the unobserved components that often become part of the error term. Therefore, this study adopts Pesaran (2004) cross-sectional dependency (CD) and Friedman (1937) tests to check for the presence (or absence) of cross- sectional dependency (cross-sectional correlation). The null hypothesis of these tests states that, the error

term is assumed to be uniformly distributed over the cross-sectional unit and the alternative hypothesis states otherwise. The Pesaran CD test statistic is computed as follows;

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\cdot\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right) \quad (6)$$

where CD, T and N denote the test statistic, time frame and the number of observations, respectively. $\hat{\rho}_{ij}$ also represent the sample estimate of the pairwise correlation of the residuals.

From equation (6), the study expresses the null and alternative hypothesis of this test as:

$$H_0: \hat{\rho}_{ij} = \hat{\rho}_{ij} = \text{cor}(\varepsilon_{it}, \varepsilon_{jt}) = 0 \qquad \text{for} \quad i \neq j$$

$$H_1: \hat{\rho}_{ij} \neq \hat{\rho}_{ij} \neq \text{cor}(\varepsilon_{it}, \varepsilon_{jt}) \neq 0 \qquad \text{for} \quad i \neq j$$

However, non-rejection of the null hypothesis indicates the absence of the aforementioned econometric problem.

In addition, Friedman (1937) propounded non- parametric test constructed from Spearman's rank correlation coefficient. The coefficient is seen as the regular product-moment correlation coefficients. Its accounts for the proportion of the variability computed from the ranks.

The Spearman's rank correlation coefficient is computed as;

$$r_{ij} = r_{ji} = \frac{\sum_{t=1}^{T}\{r_{i,t} - (T+1/2)\}\{r_{j,i} - (T+1/2)\}}{\sum_{t=1}^{T}\{r_{i,t} - (T+1/2\}^2} \quad (7)$$

Friedman's statistic is built from the average of the Spearman's rank correlation and is given by

$$R = \frac{2}{N(N-1)} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{r}_{ij} \quad (8)$$

where $\hat{r}_{ij}$ shows the sample estimate of the rank correlation of the residuals. Large values of R denote the presence of nonzero cross- sectional correlations. It must be emphasized that non-rejection of the null hypothesis indicates the absence of cross- sectional dependency.

3.4.2 Unit Root Test

This study applies Im, Pesaran & Shin (IPS, 2003) and Pesaran (2007) cross-sectional augmented IPS (CIPS) panel stationarity tests to all the sample variables used in this study. The underlying aim of these panel stationarity tests is to determine the order of integration in the variables so as to avoid any biases that may arise from non-stationary series. The use of stationary series prevents this study from reporting spurious results (Woodridge, 2015). The general unit root specification from Stock and Watson (2007) is given as;

$$Y_{it} = \delta Y_{t-i} + \theta X_{it} + U_{it} \quad (9)$$

Given the above equation, the variable Y_{it} has a unit root if $|\delta| = 1$. The variable is weakly stationary if $|\delta| < 1$. Taking Y_{t-i} from each side of equation (10) gives:

$$\Delta Y_{it} = (\delta - 1) Y_{t-i} + \theta X_{it} + U_{it} \quad (10)$$

Let $\delta - 1 = \vartheta$ so that the ADF- type specification now becomes:

$$\Delta Y_{it} = \vartheta Y_{t-i} + \theta X_{it} + \sum_{j=1}^{\lambda} \gamma_{ij} \Delta Y_{it-1} + U_{it} \quad (11)$$

Where Y_{it} represents each variable used in this study, X_{it} stands for panel specific fixed effect, λ indicates the lag length. θ, t and i represent vector coefficient, time and cross- sectional units respectively.

The unit root test involves the following null and alternative hypothesis:

$H_0: \vartheta = 0$ (The series is not stationary)

$H_1: \vartheta < 0$ (The series is stationary)

If the null hypothesis is rejected, then the variable under consideration is stationary.

3.4.3 Cointegration Test

To establish the long run relationship among the variables used in this study, the study adapts Pedroni (2004) and Kao (1999) cointegration tests. The aforementioned cointegration tests have common null hypothesis of no cointegration against the alternative hypothesis that there is cointegration among the variables employed.

The general cointegration equation is specified below;

$$Y_{it} = a_i + \rho_i t + \delta_i X_{it} + \varepsilon_{it} \quad (12)$$

where Y_{it} and X_{it} denotes economic growth and other covariates for country i and time t, respectively. In order to test the long run relationship among the variables employed, Pedroni (2004) assumed that the variables should not contain units root in their first difference. In addition, Pedroni cointegration test also allows for a maximum of only seven covariates in the model. With this, the study provides four test statistics; Panel-V, panel-rho and modified, Phillips panel parametric-ADF and panel-non-parametric. Kao cointegration test on the other hand provides three

test statistics; modified Dickey-Fuller t, Dickey-Fuller t and Augmented Dickey-Fuller t accordingly.

Pedroni (2004) cointegration test differs from Kao cointegration test in the following; first, the Pedroni (2004) cointegration test assumes a panel-specific cointegrating vector where all panels have individual slope coefficients. Again, Pedroni (2004) cointegration test provides different version of test statistics. Given this, if the probability value of each tests statistic is greater than 5% significance level, then this study would fail to reject the null hypothesis indicating that the series are not cointegrated and thus, ε_{it} is not stationary.

3.4.4 GMM Estimation

To analyze the influence of education and employment disparity on economic growth in SSA, this study uses Two-step system generalized method of moment (GMM) estimator. The adoption of this estimator is based on the advantages that GMM provides. It is hypothesized that heterogeneity and endogeneity are the main econometrics problems we mostly encounter in utilizing panel data. As such, ignoring these problems may render inconsistent or meaningless estimates (Robertoson and Symons, 2000). Hence, this study applies GMM estimation technique over other panel estimators like fixed effect, random effect and panel corrected standard error due to some advantages of system GMM. The system GMM estimator can handle panel data with small time (T) and large cross-sectional units (N), such as T=12 and N=28 in this case. This is because, in the GMM estimations the number of instruments should be less than the number of cross sections which indicate that T must be always less than N so as to validate the assumption. Furthermore, it employs the second lags of the endogenous variable as internal instruments to mitigate any potential omitted and simultaneous endogeneity issues that may develop in equation (13). As a result, this study adopted the system-GMM estimation technique developed by Blundell and Bond

(1998), which is an extension of Arellano and Bond (1991) and Arellano and Bover (1995) differenced GMM. However, the general GMM specification is provided in Equation (13) as;

$$\ln Y_{it} = \partial_0 + \emptyset \ln Y_{it-1} + \varphi_1 EDU_{it} + \varphi_2 L + \varphi_3 (L * EDU)_{it} + \varphi_4 \ln \mathbf{Z}_{it} + \rho_i + \varepsilon_{it} \quad (13)$$

where all the variables are already explained in the previous equations. **Z** indicates a vector of other control variables included in the previous equations.

Brambor et al. (2006) claimed that when there is interaction in the regression equation, it is critical to specify the marginal effect. This is because, the partial derivative of economic growth (Y) with respect to education (EDU) in equation (13) will yield $\frac{\partial lnY_{it}}{\partial EDU_{it}} = \varphi_1 + \varphi_3 L$, which denote a marginal impact of education on economic growth. Given this, it is imperative to interpret the marginal coefficients $(\varphi_1 + \varphi_3)$ and not φ_3. This will aid in determining the true effect of education on economic growth in SSA when inequality in employment is improved or enhanced.

With the belief that policymakers care more about long-run effects than short-run predictions, this study uses Papke and Wooldridge's (2005) Delta-Method to estimate the long run coefficients from the short parameters. Hence, the long run estimates are computed in this study using Papke and Wooldridge's (2005) formulae as stated below,

$$\beta_k = \varphi_k / _{1-\emptyset} \quad (14)$$

where φ_k and φ denote the shorts run estimates for each variable in equation (13) and the coefficient of the lagged economic growth, respectively. β_k represent the coefficients of the long run estimates.

3.4.5 Diagnostic Tests

The key assumptions of the system GMM estimator are the absence of second order serial correlation and over- identification of the instruments. Based on the specification of system GMM in Equation (13), first-order serial correlation is expected in the first-differenced equation. However, Arellano & Bond (1991) posits that for system GMM estimates to be valid and consistent, there shouldn't be second order serial correlation. In this case, Arellano and Bond (1991) second order serial correlation test will be used to check for the absence of second order serial correlation. The null hypothesis of this test suggests no second order serial correlation. Hence, if the probability value is greater than the conversional 5% significance level, then this study will fail to reject the null hypothesis.

In addition, the Hansen (1982) J-test for over identification restrictions is employed to ensure the validity of the instruments used in the investigations. However, if the probability value of the Hansen test surpasses the standard significance level of 5%, then this study concludes that the instruments are valid, otherwise the instruments are invalid. The null hypothesis of Hansen test states that the over identification restrictions are valid and the alternative hypothesis states otherwise

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter of the study presents the analyses and discussions of results obtained from the data. Precisely, this section of the study covers eight sub-sections. Section one and two contains the summary of descriptive statistics and the correlation matrix of the variables employed in this study. Section three and four of this study displays the panel unit root tests and the cross-sectional dependency tests results, respectively. The Cointegration tests results, the short-run system GMM results and the marginal effects of the short-run estimates are presented at section five, six and seven. The long-run results are also reported in the last section of this chapter. It is worth mentioning that this study employed fixed and random effects estimation technique as a robustness check for the long-run System- GMM estimates. This is because the fixed and random effect models also produce long-run estimates and the results are reported at section eight of this chapter.

4.1 Descriptive Statistics

This sub-section of the study presents the summary of descriptive statistics of the variables from 2005 to 2017.

It can be observed from Table 4.1 that the mean value of economic growth in SSA for the period considered in this study is approximately 4.42% with minimum and maximum values of about -1.37% and 8.25%, respectively. It can be construed from the above records that on average, economic growth in SSA for the period considered under this study is good since it exceeds the average global growth rate of 3% in 2016 (IMF, 2016). This high average growth rate in SSA

could be attributed to the fact that majority of SSA economies like Ghana, Nigeria and Cote d'Ivoire discovered growth enhancing resources like oil, coal etc. within the periods considered and that these resources enhance growth in SSA economies.

Table 4.1: Summary of Descriptive Statistics

Variable	OBS	Mean	Standard Dev.	Minimum Value	Maximum Value
Y	336	4.423	0.699	-1.366	8.254
EDU	336	4.099	1.867	0.100	5.743
L	336	4.429	0.176	3.740	4.646
IQ	336	3.154	0.622	1.079	4.119
K	336	4.714	1.291	0.01	5.864
TO	336	4.162	0.445	3.031	5.740
FDI	336	5.619	10.490	-6.0557	103.337

Note: Y, EDU, L, IQ, K, TO, and FDI are economic growth, education inequality, employment inequality, institutional quality, capital stock, trade openness and foreign direct investment, respectively.

Similarly, education inequality measured in this study by female to male ratio of the average annual absolute growth in total years of schooling is noticed to have an average value of about 4.10%. The minimum and the maximum score of this variable is 0.10% and 5.74%, respectively. This finding indicates that as education is concern, the gross school enrollment for boys is way higher than a girl child in SSA. Hence, stringent policies have to be adopted to bridge this gap in SSA. Employment inequality on the other hand is revealed to have a mean, minimum and maximum value of approximately 4.43%, 3.74% and 4.65%, respectively. It can be viewed from these results that education and employment inequality in SSA is a serious challenge and that there is an urgent need to adopt more appropriate policy to mitigate these problems. This is because inequality in education and employment do not harm only economic growth rather it also has certain adverse health impact as revealed by Lagerlof (2003).

With the control variables, institutional quality, measured in this study by regulatory quality and this access the extent to which government formulates and implement sound policies and regulations that permit and promote private sector was indicated to have a mean value of 3.15%. More ardently, capital stock and trade openness also detected to have average values of about 4.71% and 4.16%, respectively. Among the variables controlled in this study, foreign direct investment measured in this study as net foreign direct investment inflow as a percent of GDP has more negative values hence this study failed to transform this variable into its natural logarithm. To be specific, the mean value of foreign direct investment is 5.62%. With this, it can be seen that among the variables this study controlled for this empirical analysis, FDI has the highest variation and the maximum value, accordingly. It must be noted also that Capital stock is also noticed in this study to have the least minimum value among the variables controlled in this empirical exercise. Given the descriptive statistics of the variables employed in this study, the study concludes that though SSA economies are on the growth verge, however, there is the need for more appropriate policies and technique to be adopted to achieve the 8.5% average economic growth trajectory so as to ameliorate poverty in SSA as documented in Sustainable development goal (SDG 1).

4.2 Correlation Matrix

In order to check whether the variables employed for this empirical analysis have no exact linear relationship (multicollinearity) among each other, this study adopted pairwise correlation test to examine the linear association among the variables and the results are reported in Table 4.2.

Given the correlation among the variables involved in this study as reported in Table 4.2, it is observed that employment and education inequality have negation association with economic growth in SSA. Although, it is revealed that education inequality was insignificant. These findings corroborate the empirical study by Baliamoune (2007), who revealed that employment inequality reduces growth because it lowers the pool of talent people from the working group that employers can choose from. In addition, this study found that with the exception of foreign direct investment, all the variables employed in this study have a positive significant correlation with economic growth in SSA.

Table 4.2: Correlation Matrix

Variable	lnY	lnEDU	lnL	lnIQ	lnK	lnTO	FDI
Y	1.000						
EDU	-0.028	1.000					
L	-0.296***	-0.125*	1.000				
IQ	0.190***	0.441***	-0.190***	1.000			
K	0.190***	-0.018	-0.024	-0.054	1.000		
TO	0.315***	-0.030	-0.133*	-0.187***	-0.068	1.000	
FDI	-0.018***	-0.076	-0.020	-0.048	0.091*	0.338***	1.000

Note: Y, EDU, L, IQ, K, TO, and FDI are economic growth, education inequality, employment inequality, institutional quality, capital stock, trade openness and foreign direct investment, respectively. *, **, and *** denote significance level at 10, 5, and 1 percent error level.

Given the correlation coefficients as presented in Table 4.2, this study finds however that the variables employed in this study are less likely to exhibit exact relationship since the correlation coefficients of all the variables are less than 0.70 (Kennedy, 2008).

4.3 Cross-sectional Dependence Test Results

Given that the factors that affect growth in SSA are not bounded, there is likelihood that there can be cross-country correlation among the countries used in this study. With this, Pesaran (2007) indicated that in the presence of cross-country correlation (cross-sectional dependence), estimates or results can be spurious (biased and inconsistent). To ensure absence of cross- country correlation among the countries, this study hinged on Pesaran (2004) and Friedman (1997) cross-sectional dependence tests to check for the absence of cross- sectional dependency among the countries and the results are shown in Table 4.3.

Table 4.3: Cross-sectional Dependence Test Results

Test	Test statistic	Prob. value
Pesaran	7.914	0.710
Friedman	50.339	0.271

Note: Null hypothesis for both tests indicate presence of cross-sectional dependence among the countries

The results from Table 4.3 shows that there is no cross-sectional dependence (cross-country correlation) among the countries employed for this empirical study. This is because, the null hypothesis of cross-sectional independence for both tests cannot be rejected given their probability values for the Pesaran and Friedman tests, respectively. Given that there is no cross- country correlation among the countries employed in this study, the study continued to check whether the variables sampled for this investigations are stationary.

4.4 Unit Root Test Results

In order to generate efficient and robust estimates of the unknown parameters, this study adopted two heterogeneous stationarity tests to check for the order of integration of the variables; and the results are reported in Table 4.4.

Based on Im, Pesaran & Shin (IPS, 2003) test, the study reveals that, all the variables employed in this study are non-stationary in the levels except capital stock and foreign direct investment which are stationary at 1 percent significance level. Also, using Pesaran (2007) cross-sectional augmented IPS (CIPS) panel stationarity test, it shown in Table 4.4 that only capital stock is stationary in the levels. However, it is revealed in this study that all the variables employed in this study turned out to be stationary in the first difference using both tests.

Table 4.4: Panel Stationarity Test Results

	IPS Test		CIPS Test	
Variable	Levels	1st difference	Levels	1st difference
lnY	-1.236	-2.023***	-1.335	-2.622***
lnEDU	-1.486	-3.381***	-1.756	-3.775***
lnL	-0.681	-77.479***	0.109	-2.096*
lnIQ	-1.538	-2.628***	-1.672	-3.370***
lnK	-3.186***	-3.666***	-2.336***	-3.287***
lnTO	-1.294	-2.283***	-1.310	-2.979***
FDI	-1.950***	-2.303***	-2.646	-3.929**

Note: Y, EDU, L, IQ, K, TO, and FDI are economic growth, education inequality, employment inequality, institutional quality, capital stock, trade openness and foreign direct investment, respectively. *, **, and *** denote significance level at 10, 5, and 1 percent error level.

Given the stationarity of the variables in this study, the study continued to test for the long-run relationship among the variables employed in this study.

4.5 Panel Cointegration Test Results

To verify that there is a long run relationship between economic growth and the explanatory variables. This study adopted Pedroni (2004) and Kao (1999) tests for cointegration and the results are shown in Table 4.5.

Using both tests, it is evident that there is a strong long run association among the variables employed in this empirical study as reported in Table 4.5. This is because, the null hypothesis of no long run association (no cointegration) is rejected at the standard significance levels of 1, 5, and 10% in all the tests conducted. Hence, this study concludes that there is existence of cointegration among economic growth and other explanatory variables employed in this study.

Table 4.3: Panel Cointegration Test Results

Pedroni Test		Kao Test	
Panel v	-3.652***	MDF	1.708**
Panel rho	7.207***	DF	1.378*
Panel t	-4.725***	ADF	1.796**
Panel ADF	2.537***		
Group rho	9.171***		
Group P-P	-6.979***		
Group ADF	2.912***		

Note: MDF, DF, and ADF are Modified Dickey–Fuller, Dickey–Fuller, and Augmented Dickey–Fuller, respectively. *, **, and *** denote significance level at a 10, 5, and 1 percent error level.

After establishing the long run relationship, the study estimates both the short run and long run results of the system-GMM and their corresponding marginal effects due to the interaction term in the estimation model.

4.6 Short-Run System GMM Results

This study reports the short run GMM results and their marginal effects in Table 4.6 and Table 4.7, respectively.

In Table 4.6, it is noticed that the past value of economic growth has a positive significant effect on current economic growth. This positive effect implies that economic growth in SSA diverge, as 1% increase in past value of economic growth will increase current economic growth in SSA

by approximately 1.88%. This growth divergence in SSA economies could be attributed to the differences in technology and natural resources endowment as revealed by Erdogan et al. (2021).

Turning to the variables of interest, it is observed in Table 4.6 that the unconditional effect of education inequality has a negative but insignificant effect on economic growth in SSA. This insignificant effect of education inequality on economic growth in SSA could be ascribed to the fact that primary school graduates in SSA lack the adequate skills and knowledge that would make them contribute meaningfully to SSA's growth and development.

Contrary to the study's expectation, it is revealed that the unconditional effect of employment inequality has a positive and significant impact on economic growth in SSA. The coefficient of the employment inequality indicates that if employment inequality increases by 1%, economic growth in SSA will increase by about 11% holding all the covariates constant. The employment inequality is suggested to restrict the pool of talent from which employers can choose and therefore, it has the capability to lower the average workforce and economic growth. However, the positive significant effect of employment inequality detected in this study in the short- run is not surprising, since the study by Klasen & Lamanna (2009) revealed a positive significant effect of employment inequality on economic growth in MENA countries, and postulates that in the short-run, employment inequality does not harm economic growth due to searching and matching fluctuations that mostly persist in the labour market.

Table 4.4: The Short- Run System-GMM Estimates

	Coefficients	Prob. value
$\ln Y_{t-1}$	1.880	0.004
	(0.337)	
EDU	-0.115	0.763
	(0.159)	

L	0.111	0.012
	(0.041)	
L*EDU	-0.219	0.006
	(0.072)	
lnIQ	0.076	0.006
	(0.025)	
lnK	0.002	0.768
	(0.007)	
lnTO	0.070	0.003
	(0.022)	
FDI	0.001	0.002
	(0.0003)	
Constant	0.275	0.254
	(0.236)	
Observations	336	
No. Groups	28	
No. Instruments	25	
AR(2) (P- value)	0.231	
Hansen test (P- value)	0.710	

Note: Standard errors in parentheses. The probability values less than 10%, 5% and 1% shows the significance of the variable.

In addition, it is also noticed in Table 4.6 that the coefficient of the interaction between employment and education inequality on economic growth is negative and statistically significant. However, to reveal the true effect of education inequality on economic growth in SSA, it is imperative to account for the marginal effects (conditional effects). Since the derivative of economic growth with respect to education inequality gives $\frac{\partial lnY_{it}}{\partial EDU_{it}} = \varphi_1 + \varphi_3 L_{it}$ in a model with interaction. Given this, the marginal effect results in Table 4.7 reveals that at the 25th and 50th percentiles of employment inequality, education disparity has a statistically significant negative influence on economic growth in SSA. These results suggest that if employment inequality widens or is at it mean, education inequality will worsen economic growth in SSA by approximately 18% and 9.70%, respectively. These findings point to the view that if education inequality widens in SSA, gap in employment will also increase, resulting in a negative repercussion on economic

growth in SSA. This finding fall in line with the study Klasen (2002), Klasen & Lamanna (2003). Also, at the 75th and 95th percentiles of employment inequality, this study found education gap to impact negatively on economic growth though the effect were realized to be insignificant.

In controlling for the other variables in this study, the study revealed that institutional quality has a positive and a significant effect on economic growth. It is worth emphasizing that improvement in institutions will enhance growth by approximately 0.08%. It can be deduced from this result that better institutions tend to eradicate corruption and other social vices that hinders economic growth, hence better and strong institutions is vital component for growth as suggested by Effiong (2015). Capital stock is also shown in Table 4.6 to have a positive but insignificant effect on economic growth in SSA.

As Trade openness is concerned, this study found a positive and significant effect of trade openness on economic growth in SSA. The coefficient of 0.70 indicates that if trade improves in SSA, economic growth will also increase by about 0.70% holding other variables constant. This results implies that trade in SSA facilitates exchange of technology and other growth- enhancing equipment that improves economic growth in Ghana. The above finding supports the study by Blanco (2013), and Duodu & Baidoo (2021) but contradicts the empirical work by Gazdar and Cherif (2015) in MENA countries.

Lastly, this study found foreign direct investment to have a positive and a significant effect on economic growth in SSA. Specifically, 1% improvement in foreign direct investment will enhance growth in SSA to increase by about 0.1%, holding all the other variables constant. The positive effect of foreign direct investment suggests that an increase in foreign investment in SSA will have

a positive effect in SSA economies since these investments will come and complement the local ones.

Table 4.5: The Marginal Effect Estimates

Percentile	Percentile value of L	Coefficient	Prob. Value
25%	-0.318	-0.181 (0.039)	0.000
50%	0.066	-0.097 (0.043)	0.034
75%	0.320	-0.0413 (0.055)	0.456
95%	0.438	0.015 (0.061)	0.803

Note: Standard errors in parentheses. The probability values less than 10%, 5% and 1% are shows the significance of the variable

The AR(2) and Hansen tests show that the estimates in Table 4.6 are accurate and efficient. This is because the p-values of 0.231 of the AR(2) indicates non- rejection of the null hypothesis of no second-order serial correlation existing among the variables. Furthermore, the Hansen test also indicates that there exists instruments validity since the p-value of 0.710 indicates non-rejection of the null hypothesis of instruments validity.

4.7 Long-Run Estimates

At this section, this study presents three alternative long-run regressions. The study first reports the estimates of fixed and random effect model as a baseline long- run estimates. However, because of the introduction of the lag dependent variable in the regression, there was a risk of endogeneity, which this study controlled for such econometric problem by employing system- GMM estimation technique. The study reports these results in Table 4.8.

It is shown in Table 4.8 that the fixed effect and random effect estimates are not statistically different so this study interpreted only the fixed effect estimates based on Huasman-Wu test. The study found that education inequality has a positive and negative effect on economic growth in fixed effect and system- GMM estimations, respectively. These means that 1% increase in education inequality will increase and decrease economic growth in SSA by approximately 7.90% and 4.10% although, the effect was insignificant in system- GMM estimation. The positive significant effects found in fixed effect model could possibly be attributed to endogeneity problem that fixed effect model is unable to control in this study. Again, this study found that employment inequality has a positive long- run effect on economic growth in all the estimations, though the effects were detected to be statistically insignificant in fixed and random effect models. Contrary to the evidence by Baliamoune (2007) and Klasen (2002) in SSA, this study found that in the long-run, if employment inequality increases by 1%, economic growth in SSA will also increase by about 9.20% holding all other variables unchanged. Employment inequality is suggested to reduce growth both in the short and long- run, however, the positive effect of this variable in this study could be viewed from the sample period and the estimation technique this study applied.

Table 4.8: The Long- Run Estimates

	FE	RE	GMM
EDU	0.079***	0.078***	-0.041
	(0.017)	(0.017)	(0.140)
L	0.012	0.012	0.092**
	(0.017)	(0.017)	(0.409)
L*EDU	-0.036	-0.036	-0.1827*
	(0.051)	(0.052)	(0.940)
lnIQ	0.110***	0.112***	0.634*
	(0.025)	(0.052)	(0.330)

lnK	0.035***	0.035***	0.0177
	(0.005)	(0.005)	(0.059)
lnTO	-0.082***	-0.075**	0.581***
	(0.029)	(0.029)	(0.158)
FDI	0.001	0.001	0.009**
	(0.001)	(0.001)	(0.004)
Constant	6.549***	6.511	2.299
	(0.148)	(1.897)	(1.432)

Note: Standard errors in parentheses. *, ** and *** represent significance at 10%, 5% and 1% level of significance. GMM, FE and RE denote System- GMM, fixed effect and random effect regression, respectively.

Consistent with theory, it is revealed in this study that, in the long-run the interaction between education and employment inequality has a negative and significant effect on economic growth in SSA only in the system- GMM estimations. The coefficient of 0.18 suggests that inequality in education dwindles employment inequality to cause economic growth to fall by about 18% in SSA. The talent allocation theory predicts that the gender gaps in access to managerial positions led to a decrease in the average talent of managers, which reduced aggregate productivity and hence economic growth. Given this, the study brings to the banner that education inequality seeks to widen employment inequality to have a negative effect on economic growth in SSA.

Given the controlled variables employed in this study, it is noticed that the short- run estimates are not statistically different from the long-run estimates and hence, this study failed to interpret the coefficients of the long- run estimates. This study concludes that education and employment inequality are though important to be integrated in the mainstream policy and public discourse, however, inequality in primary school education should not be a worrying issue in the SSA economies.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary, conclusions, recommendations and limitations of this study to argument future areas of research. The initial section of the study introduces this chapter. Section two of this chapter presents the summary and conclusions of this study whilst the last section of this study highlights on policy implications.

5.2 Summary of Main Findings

This subsection of the study focuses on the key findings this study detected. As it is presented in Table 4.6, Table 4.7 and Table 4.8, this study found that the unconditional effect of education disparity has a negative insignificant effect on economic growth in SSA in both short and long-run. However, in uncovering the true effect of education inequality on economic growth in SSA, this study finds that at the 25th and 50th percentiles, education inequality has a negative significant influence on economic growth. In addition, this study found that employment disparity has a positive significant effect on economic growth in SSA. Furthermore, it is noticed in this study that the coefficient of the interaction between employment and education inequality on economic growth is negative and statistically significant. Again, this study found that all the controlled variables[5] have a positive significant effect on economic growth in SSA in both short and long-run. Lastly, it is shown in Table 4.6 that economic growth diverges in SSA as the past value of economic growth has positive significant effect on current economic growth.

[5] Institutional quality, capital stock, trade openness and foreign direct investment

5.3 Conclusion

The association between education and employment inequality on economic growth has not been extensively discussed among scholars in SSA. The primary focus in literature has been based on the role that education plays in influencing economic growth in sub Saharan Africa. With this, the precise link between education and employment inequality on economic growth need to be investigated empirically in SSA. This study therefore uses a balanced panel data on twenty- eight (28) selected SSA countries to explore the impact of education and employment inequality on economic growth in SSA for the period 2005 to 2017. Applying Two step system-GMM estimation technique, this study concludes that education and employment inequality are vital determinant of economic growth in SSA, however, lower gap in primary school education should not be a worrying issue in SSA since lower inequality in primary school education was found to be statistically insignificant. Again, it must be also noted that, gaps in education inequality really influences employment inequality to dwindles economic growth in SSA, as a result gaps in secondary school and tertiary education should be of a prime focus in mainstream policy and public dialogue in SSA.

5.4 Recommendations

Given that the interaction term between education and employment inequality has significant negative effect on economic growth in SSA, this study recommends that governments and policy makers in SSA should take education disparity, particularly at the secondary and tertiary levels, extremely seriously in order to close education inequality gap. Since education inequality complements employment inequality to dwindle economic growth in SSA. This can be done if governments in SSA contract journalists and other educationalists to organize workshops or broadcast information about the negative effects of education inequality in SSA, so that high-level

of professional courses such as science and engineering, which are primarily given to men and other specific people, would be curtailed in SSA. This will aid in reducing SSA's educational inequity in order to achieve perfect educational equality as envisioned in the Sustainable Development Goals (SDGs).

More so, since employment inequality has a positive effect on economic growth, this study suggests that governments in SSA through the ministry of gender, children and social protection should devise policies that will enhance females to be competitive during their postpartum period. This is because a woman leaves or vacates her position for approximately three months during her postpartum period, which adversely affect the operation and growth of business. As a result, government should provide entrepreneurial and technological orientation to women to help them become more resilient and active during the postpartum.

Furthermore, given the positive significant effect of foreign direct investment in SSA both in short and long- run, this study recommends that governments in SSA should adopt a new approach to create friendly business environment so as to encourage foreign investors to invest in the domestic economy. This can be done if governments of SSA economies implement a revised foreign investment laws that offer investors essential guarantees and protection against discrimination, expropriation and the right to freely dispose off their investment in SSA. This will attract foreign investors and lower their costs of doing business in SSA.

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