INEQUALITY AND THE TRANSLATION OF ECONOMIC GROWTH INTO HUMAN DEVELOPMENT: EVIDENCE FROM AFRICA

BY

PHILIP AGYEMANG DUAH

(10343334)

THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PHILOSOPHY (M. PHIL) DEGREE IN ECONOMICS.

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DECLARATION

I, PHILIP AGYEMANG DUAH, hereby declare that this thesis is the original research undertaken by me under the guidance of my supervisors. With the exception of references to works by other people which have been duly acknowledged, this thesis is entirely my work and has neither in part nor whole been submitted for another degree elsewhere.

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PHILIP AGYEMANG DUAH

(CANDIDATE)

…….

DATE

…… ……

PROF. AUGUSTIN K. FOSU **DR. MICHAEL DANQUAH**

(SUPERVISOR) (SUPERVISOR)

DATE: ……. DATE: …….

DEDICATION

This thesis is dedicated to my Uncle, Mr. Anthony Ohemeng Boamah, for the unwavering support and kindness he has shown me all through my education. Special thanks go to another Uncle and Auntie of mine, Mr. Joseph Ohemeng and Margaret Ohemeng, for their invaluable advice which has brought me this far.

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ABSTRACT

Considering the level of inequality (GINI) and its importance in economic performance and the attainments of human development (HD), this paper examines the role of inequality in the translation of economic growth (GDPG) to HD. The study was conducted using 39 African countries from the period of 1980 to 2015. A change in non-income HD measure (∆HD) comprising life expectancy at birth and education with a five-year difference was computed. An average for every five-year period corresponding to the various five-year intervals for the ∆HD was obtained for GINI and GDPG. The study employed panel data techniques such as random effect (RE), fixed effect (FE) and system generalized method of moments (GMM) in addressing its objectives with emphasis on the system GMM results due to potential endogeneity between the HD measure and economic growth. These estimations were carried out for the human development index (HDI) for comparison purposes. Based on Model 5— which is the main model of the study as it features the interaction between GINI and GDPG, GINIGDPG — RE, FE and system GMM results for the ∆HD measure find that inequality negatively influenced the translation of economic growth to HD over the period of study. Model 5 of the ∆HDI result, on the other hand, showed only a significant negative coefficient for the interactive variable, GINIGDPG, under the system GMM results, supporting the results of the ∆HD measure. Furthermore, given the finding in Africa that inequality inhibits economic growth, coupled with the finding here that economic growth positively influences HD, the study finds a significant adverse impact of inequality on HD.

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CHAPTER ONE

INTRODUCTION

1.0 Background

Africa, after Latin America, is the second most unequal region in the world (Milanovic, 2003; ADB, 2012; Fosu, 2017), as out of the 10 most inequitable countries in the world, 6 of them were from Africa. Specifically, Milanovic (2003) compared Africa with Asia and Latin America in relation to inequality and found an average Gini of 47% for Africa, 35.6% and 50.5% for Asia and Latin America, respectively, supporting the aforementioned statement. Fosu (2010, Social Science Quarterly) finds similar statistics for these regions in relation to inequality. The marked inequality in Africa is also complemented by some geographic differences between urban and rural areas where the poor and the deprived are clustered together (AfDB Market Brief ,2012).

The role that income inequality plays in an economy has received quite a bit of attention, especially in policy circles at the international front. For example, the World Bank Group has accentuated the eradication of extreme poverty and increasing the incomes of the bottom 40% of developing countries as part of their key objectives. The International Monetary Fund (IMF) has also weighed in on the role of inequality as a cause and consequence of economic growth (see, Ostry et al., 2014).

Inequality affects opportunity, education as well as health outcomes and thus the socio- political environment which themselves have an impact on people's behavior that ultimately affects

economic performance. Evidence worldwide has shown the deleterious effect of high levels of inequality over the past two decades. This effect is shown to influence economic growth, poverty reduction, social unity and public health (Adesina, 2016). With respect to economic growth, Barro (2000) advanced the view that inequality negatively affects economic growth in developing countries. Huang et al (2009) also found that higher inequality is detrimental to growth in non- OECD countries. In the case of poverty, Ali and Thorbecke (2000) found that poverty reduction is more sensitive to inequality than to economic growth in Africa. Thus, reducing inequality has a higher impact on poverty reduction compared to economic growth. Further, it has been estimated that a 1% increment in income levels could result in a 4.3% reduction in poverty in countries with very low levels of inequality or as little as 0.6% reduction in poverty in countries with very high levels of inequality (Ravallion, 2007). In the case of social unity, Wilkinson and Pickett (2010, p. 195) advanced the view that high inequality is "divisive and socially corrosive", which invariably weakens social cohesion. In the case of public health, Wilkinson (1996) advanced the view that the degree of income inequality in society determines its average health status. That is, the health status of citizens worsens, the wider the gap between the incomes of the rich and poor. All these findings presuppose that reducing inequality is not only helpful toward improving economic performance but also imperative.

Human development (HD) as defined by Amartya Sen— a Nobel laureate who played a very instrumental role in conceptualizing its framework— "is the process of expanding the real freedoms that people enjoy" (Sen, 1999). Similarly, the United Nations Development Program (UNDP) defines HD as the process of widening people's choices by expanding their capabilities (HDR, 1990, p10). HD's intellectual precursors could be dated back to the basic needs approach

by the International Labor Organization (ILO), the World Bank and Sen's Capabilities approach. HD by the UNDP is measured using the composite index, the Human Development Index (HDI). The calculation of the HDI by the UNDP makes use of three basic indicators which are literacy, life expectancy at birth and the standard of living.

High economic growth rate is a desired objective as it comes with benefits which in due course lead to an enhancement in HD (see, Sen, 2000; Ranis, 2004). Specifically, Sen (1999) describes economic growth as a means for improving and expanding the substantive freedoms valued by people. These freedoms, he intimated, are strongly associated with enhancement in the quality of life, such as greater chances for people to be in good health, eat healthier and have longer life span. Fosu (2004) further stresses the importance of economic growth in the enhancement of HD in the long run. However, this link is not automatic in the short and medium run as found in the studies of Baster (1972); Adelman (1975); Hicks & Streeten (1979); Morris (1979); Ramirez et al (1998).

Although strong economic growth can promote development, not every economic growth amounts to increasing levels of development as posited by the HD report (HDR, 1996). Similar rates of growth can have disparate effects on poverty, employment opportunities of the poor and extensive indicators of HD. The extent to which economic growth reduces poverty and to a large extent enhances the social indicators of HD depends on the degree to which the poor partake in the growth process and share in its proceeds — inclusivity of growth. Thus, both the pace and the pattern of growth are vital in reducing poverty and improving the social indicators of HD.

Economic growth, according to Ramirez *et al* (1998), can generate a virtuous circle of prosperity and opportunity, or vicious circles of poverty and deprivation, depending on specific factors such as policy choices, structural factors among others. Specific factors include: institutional environment (Fosu, 2002), household consumption choices, level of inequality, government allocation to HD-related social expenditure (Ramirez *et al*., 2000; Ranis, 2004). For instance, Angola and Georgia had per capita incomes of $22,000, but Georgia's health and education levels were almost the same as those of the Organization for Economic Cooperation and Development (OECD) countries while Angola's were among the poorest in the world (HMT DFID, 2005). The HD report series by the UNDP affirms that growth will only promote HD if public action is directed vigorously at ameliorating the ills of growth and then redirecting its benefits. These findings identify and emphasize growth to be a necessary condition for development but not a sufficient one.

Improvement in HD is in part dependent on the current level and the direction of inequality. Several authors have often attributed the poor relation between growth and HD to inequality (Vandemoortele, 2009). For example, Fosu (2009) finds the effect of economic growth on poverty to be a decreasing function of initial inequality. This finding is important as Ramirez *et al* (1998) find that a large proportion of poor people's income is spent on goods that directly affect their health and education status. So in the wake of high inequality levels, HD components such as health and education of the poor might be inhibited.

Two studies have investigated the factors that tend to mitigate the translation of economic growth into HD in sub-Sahara Africa. The first study was by Fosu (2002). He investigated this

transformation process with political instability as the inhibitive factor. The second study was by Mohammed (2016). Following Fosu (2002, 2004), he hypothesized that inequality adversely affects the transformation of growth to HD.

The purpose of this thesis is to explore the extent to which inequality has inhibited the translation of economic growth to HD which is similar to that of Mohammed (2016). But the present analysis is carried out in a panel data framework and with a *non-income* HD measure as opposed to the HDI used by Mohammed (2016) which includes income.

1.1 Statement of Problem

Human development by Alkire (2002) is a multidimensional topic that encompasses poverty, social indicators, cultural psychology and basic needs. The multifaceted nature of the HDI as remarked earlier, reemphasizes the link between growth and HD. Economic growth has the tendency to increase the incomes of the less privileged in society which may eventually lead to an improvement in their HD levels, but if it is accompanied by high levels of inequality, the growth-HD nexus may be weakened. This relationship is confirmed in studies by Ravallion, (1997); Bourguignon, (2003); Epaulard, (2003); Kalwij and Verschoor, (2007); and Fosu, (2009). Since inequality may have a negative influence on poverty, basic needs and social indicators such as education and health which form essential part of HD (Ravallion, 2007; Wilkinson, 1996), the level of inequality should also be an issue of greater concern in achieving higher levels of HD.

While HD may have improved generally in Africa (Fosu and Mwabu, 2010), Africa lags behind all the other continents. A very recent paper by Kpolovie et al (2017) finds that Africa has a mean Human development index (HDI) of 0.536, which apparently, is the lowest compared to the rest of the continents − Asia, 0.714; Europe; 0.845, North America, 0.733; South America, 0.738; and Oceania, 0.693. Several factors may have contributed detrimentally to Africa's HDI. Inequality is hypothesized by the study as one of the factors. Given the long-standing high levels of inequality in Africa and its harmful effects (Wilkinson, 1996; Harris, 2001; Vandemoortele, 2009), and the relatively low average HDI as indicated by Kpolovie et al (2017), the thesis seeks to ascertain the crucial role inequality has played in the translation of economic growth into HD in Africa.

The current thesis complements Fosu (2002) who showed political instability— an institutional environment variable — to be one of the factors that distorts the transformation of growth into HD among sub-Saharan African countries. However, it also serves as an extension to Mohammed (2016) who showed inequality as negatively affecting HD measured by the HDI among sub-Saharan African countries.

1.2 Research Objectives

The main objective of the thesis is to investigate the link between inequality, growth and Human development in Africa. The following objectives are considered;

- Examine the indirect effect of inequality on HD through its interaction with economic growth.
- Examine the direct effect of inequality on HD.

1.3 Research Questions

In order to address the objectives above, the ensuing questions will be answered;

- Does inequality affect the translation process of economic growth into HD?
- Does inequality independently have an impact on HD?

1.4 Relevance of the Study

The link between economic growth and HD has come to be one of the widely discussed topics at the international front. Ranis (2004) hypothesized the inhibitive effect of inequality on HD but did not engage in any rigorous econometric analysis to test this hypothesis. Ramirez *et al*., (2000) on the other hand, ran an OLS regression with life expectancy as the proxy for HD thus as part of the explanatory variables, they used two measures of income distribution, the income share of the bottom 20%, and the ratio of the income share of the top to the bottom quintile. They found the coefficients of the income distribution variables to be insignificant.

However, since high inequality is believed to hinder the efforts of countries, particularly in Africa, to achieve higher levels of HD (HDR, 1996), this thesis reexamines the role of inequality in HD in Africa in a panel framework employing a more rigorous estimation technique, system generalized method of moments (GMM) and following Fosu's (2002) framework, which allows an interaction between economic growth and inequality in its econometric specification. The interaction between these two variables is important as it addresses the first objective of the thesis.

The study is relevant to Africa as it seeks to uncover the role inequality may have played in the attempts by African governments to improve the HD of their citizenry. And since most African governments have prioritized achieving the sustainable development goals (SDGs), the results of the study should inform these governments about the role of inequality in this regard.

1.5 Organization of the Study

There are five chapters in all. Chapter one provides the introduction, which, basically, envelopes the background and rationale for the study. Chapter two provides the Literature review. This chapter focuses on providing insights into the existing theoretical and empirical literature on the concept, the nexus and the medium through which inequality, economic growth and HD relate. This section is much particular about the transformation of economic growth into HD and the factors that affect this transformation process, with emphasis on inequality. Chapter three looks at the methodology and data description, comprising the theoretical framework, the econometric specification, the data sources and the variables used in addressing the research objectives. Chapter four presents the discussion of results in line with the objectives stated afore. Chapter five presents a summary and conclusion of the study, and suggests policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The general objective of this chapter is to review theoretical and empirical evidence on the transformation of growth into human development, emphasizing the role inequality plays in this process. The first section looks at the literature on the transformation of economic growth into HD; the second section looks at the literature on inequality and HD and the third section looks at some of the factors that affect HD in relation to the translation process.

2.1 The Transformation of Economic Growth into HD

2.1.1 Brief Historical Account

Experts on social policy and planning in 1969 cautioned the use of Gross National Product (GNP) per head and its growth as the sole measure of economic development (Hicks and Streeten, 1979), as it tended to ignore the large areas of poverty, stagnation, marginality and social and economic exclusion (UN, 1969). Scholars suggested that development should be seen as offering favorable conditions for the realization of the potentials of humans (Seers, 1972). These concerns together with other development- related issues spurred the argument for a change in the development objectives and the replacement of the purely macroeconomic objective with the satisfaction of the basic needs (which is a human-centered approach of development) (Hicks and Streeten, 1979; Streeten *et al.*, 1981). A clear depiction of the inadequacy of GNP per capita— surrogate for development— is provided in Table 1.

TABLE 1: ECONOMIC PROSPERITY AND LIFE EXPECTANCY, 1985

Country	GNP per capita	Life expectancy at birth
China	310	69
Sri Lanka	380	70
Brazil	1,640	65
South Africa	2,010	55
Mexico	2,080	67
Oman	6,730	54

Source: World Development Report 1987

From Table 1, it can be deciphered that countries with huge GNP per capita (rich in conventional economic terms) unfortunately have lower life expectancy at birth compared with those with unimpressive GNP per capita (poor in conventional economic terms). For example, South Africa with as much as 2,010 GNP per capita appears very poor in its achieved quality of human life but countries such as Sri Lanka and China with lower GNP per capita do have higher longevity rate.

These concerns led to the adoption of a composite index, the HDI, by the UNDP. The theoretical foundation of the HDI is embedded in the Nobel Laureate Amartya Sen's work on the capabilities approach (Sen, 1985). He defined a person's aptitude to live a good life in terms of the set of invaluable "beings and doings", for example, being in good health, among others, to which he/she has real access. In coming up with a better measure of people's well- being and deprivation, Amartya Sen argues that neither income or command over resources, nor happiness

and fulfillment of desires constituted good enough measures of human well- being but rather it is what people are able to be and do (Sen, 1985). This approach has been employed, for example, by the UNDP, extensively in the context of HD as a much comprehensive and deeper alternate to economic metrics, such as GDP per capita growth which was employed in earlier times as a proxy for human welfare.

The HDI is preferred to the GNP per capita as it takes into account the distributional aspects (Desai, 1993). It is proven to be a more adequate index compared to the GNP per capita (Streeten, 1994; 1995) and as well captures very important aspects of human development (Haq, 1995).

Nevertheless, economic growth has not outlived its usefulness, as it palpably strikes as a major contributor in enhancing the capabilities of people and consequently improving HD since it embodies the economy's command over resources (Sen, 2000). Economic growth is seen as a necessary instrument in advancing HD as it enhances the provision of resources for sustained improvements in HD (Strauss and Thomas, 1998). Studies have shown the enhancement in incomes to result in improved health and educational outcomes (see, for example, Case et al, 2002; Haddad et al, 2005 among others). Economic growth serves as an indicator to investors for investing their resources in an economy, thus creating employment and generating income, which at the end creates the aptitude for individuals to lead good quality lives by investing in HD- related commodities. Poverty is understood as a deprivation of one's capability to live a good life, get educated, and economic growth is understood as a capability enhancer.

Economic growth, historically, has been effective in providing the enabling grounds for societies to improve the quality of life of their members. The ultimate lesson from the past 50 years of development points to the fact that economic growth has the potency of taking people from poverty, offering them varied choices to lead a better quality life and hence advancing human development (Rodrik, 2007). Studies that compare the experiences of a wide range of developing countries constantly find that rapid and sustained economic growth is the most vital instrument for poverty reduction. A classic estimate from these studies is that a 10% increment in the average income of a country will decrease the rate of poverty by about 20 to 30 percent (see, Ravallion and Chen, 1997; Adams R, 2002). The role of growth in poverty reduction is established by research on individual countries and groups of countries. For instance, a study of 14 countries in the 1990s found that poverty fell in 11 countries that experienced significant economic growth while it rose in the 3 countries with low or stagnant economic growth (Operationalizing Pro-Poor Growth Programme, 2005).

2.1.2 Translation of Economic growth into HD

Human development, in recent times, has been viewed as the center of human activities with economic growth being a potential instrument for advancing it. This is reflected in the Human Development Report (1996) that economic growth increases the material base needed to fulfill the basic needs of humans. For instance, citizens of the Indian state of Kerala have life expectancies and literacy rates comparable to those of many developed countries but they are not experiencing many of the benefits the citizens of such countries are enjoying (such as better housing, transportation, or entertainment), demonstrates in this case the importance of economic growth as a mechanism for attaining a wide range of capabilities (Ranis, 2004).

Ramirez *et al.,* (1998) firm up on the importance of growth in HD by comparing Botswana with Sudan. It appeared both countries started from a similar footing in 1970 on the allocation of public expenditure to health and education ($96 in 1987 prices in Sudan, and $65 in Botswana). But Botswana as at 1992 had expenditure on health and education rise to about $466 against Sudan whose expenditure had risen to about $114. They intimated that the marked difference in expenditure on health and education in both countries at the time was not due to dissimilarities in public expenditure ratio but by the much faster income growth. In contrast, Fosu and Aryeetey (2009) argue that the marked difference in public expenditure, especially, on health was necessitated by the prevalence of HIV/AIDS.

A study by the Department for International Development (HMT DFID, 2005) showed that on average for low-income countries, a 10% increment in per capita income is associated with an 11% increment in education expenditure, an 11.4% increment in health expenditure (of which both are precursors of HD advancement) and a 12.7% increment in tax revenue. The study also revealed that a sustained 2% increase in per capita growth has the potential of bringing forward the date at which a typical low-income country could internally finance the required health expenditure rate ($40 per capita) by 33 years (Venables, 2006).

Ranis (2004) and Ramirez *et al.,* (2000), explored the nexus between growth and HD. They looked at the two-way link between growth and HD. The growth-HD link was very much dependent on public expenditures on health and education—mainly, female education. This public expenditure by UNDP (1991) is expressed in three ratios, that is, the public expenditure ratio, which is the amount of GNP expended by the different levels of government; social

allocation ratio, which is the amount of total government spending specifically to finance HD-related expenditures and finally the priority ratio, which is the amount of total HD sector expenses to specifically finance priorities within the HD sector. Expenditures which have productively advanced HD are termed "priorities" (UNDP, 1991). For example, basic education is seen to have had greater effect on HD than tertiary education making it a "priority". The exact definition of the "priority area" is contingent on the phase of development of a country. Marked variations exist in each of the ratios across countries, suggesting that at the same level of GNP, there will be different levels of government outlays on HD priorities (UNDP, 1991; UNDP, 1996).

Economic growth indirectly augments private expenditure on HD through government budgetary allocations. Particularly, Anand and Ravallion (1993) advance the view that most of the impact of economic growth on HD are likely to come from government budgetary expenditures. However, the efficacy of economic growth to yield a good quality of life depends to a large extent on the efficiency of expenditure targeting and delivery. The effectiveness of public spending is reliant on the quality of governance (Rajkumar and Swaroop, 2002).

HD is also enhanced by the contribution of Gross National Product (GNP) through channels like civil society in the form of communal organizations and non-governmental organizations (NGOs) (Ramirez et al., 2000). Activities of the civil society and NGOs are characteristically directed towards the objectives of HD. Such activities include, the building of schools to improve education, and projects aimed at improving nutrition and health, mostly in deprived areas. Resources for these NGOs and the civil society are sourced from private donations, governments

as well as from foreign and domestic sources. Generally, NGOs tend to be a major source of HD advancement in some areas (Riddell et al, 1995).

2.2 Inequality and HD

One of the main findings of the first 10 years of the Millennium Development Goals (MDGs) (now, SDGs) is that inequality crucially matters. HDR (2005) posits that inequality is a fundamental issue as extreme inequality has a strong impact on what people can be and do. The rising inequality within and among countries is one of the greatest challenges facing the world today. Equality matters as an end in itself, and it matters as one of the quickest means to reducing absolute poverty (HDR, 2010). According to Wilkinson and Pickett (2009), greater income equality has the power to help forge a healthy society, where there is less violence, less drug dependence, where high literacy rate is recorded among children. HDR (2005) posits that the failure to curb inequalities will ensure that the first principles of Millennium declaration which include commitment to social justice, equality and human rights are not progressively translated into HD at the expected rate.

The important reasons for concern about inequality— entrenched disparities in wealth, gender, region and ethnicity — are its potential adverse effect on growth, democracy, social cohesion and achieving the SDGs (HDR, 2005). Inequality has the potential of obstructing long-term social and economic development, poverty reduction and poverty- reducing effects of growth, people's sense of fulfillment and self- worth, social cohesion, and health (Sen, 1995; Wilkinson, 1995; Ali and Thorbecke, 2000; Barro, 2000; Wilkinson and Pickett, 2010; Fosu, 2011). Sen (1995) advanced the view that the sensitivity of poverty to growth depends on the country's

income distribution. For instance, a study by Fosu (2017) finds that developing countries whose main driver of poverty was economic growth could have further achieved much progress if there were favorable income distribution. He further advances that initial levels of inequality limit the efficacy of growth in poverty reduction while for a given level of growth, growing inequality directly increases poverty. It is important to note that sustainable development cannot be achieved if people are excluded from opportunities, services and a chance to lead quality life. The prevalence and persistence of inequality which is a marked feature of developing countries, most especially African countries, has the tendency to rob people of opportunities that could help them lead quality lives by way of lifting them up from their impoverished states.

2.2.1 Relationship between Inequality and HD

HDR (2005) addressed the growing inequality and the global gap between the rich and the poor as one of the economic ills obviating the efforts of countries to improve the quality of life of their citizenry. The report indicated that in the last 20 years the unequal distribution of income, measured by the Gini coefficient, had worsened within many countries and criticized the lack of seriousness that politics attaches to issues of unequal distribution of income, wealth, and social power. The report then recommended that strategies for HD should center on distribution in the future and that measures to combat extreme inequality be included in the plans for the realization of the MDGs. Indeed, inequality is now explicitly stated as goal 10 of the SDGs.

Although growth impacts HD, important conditions need to be met. As part of these conditions is the distribution of income at both the micro economy and macro economy levels. Ranis (2004) posits that at the micro economy level, an individual's consumption choice can be an important

factor in raising HD; however, an individual's consumption choice may not always be directed towards commodities that will contribute maximally to HD. This is evidenced in a study by Von Braun (1988) that among Gambian households, household calorie consumption increases with the proportion of food under women's control. A similar study by Garcia (1990) in the Philippines also finds that consumption of calories and proteins increases with greater share of income accruing directly to women validating the aforementioned evidence.

The distribution of increased income as a result of growth also has repercussions for HD at the national (macro) level. Ranis (2004) argues that making the distribution of increased income more equal improves the income of the poor, who will eventually spend on HD-maximizing commodities. This is further supported by Birdsall, Ross, and Sabot (1995), who find that Brazil's enrollment in school among poor people would be 40% higher, if the income distribution in Brazil were equal to that of Malaysia.

Several studies propose a significant relationship between income inequality and HD. For example, Mikk (2008) sought to compare the Gini index between the Baltic states and other countries and also to examine the correlation between income inequality and HDI using a sample of 129 countries. The study showed a strong negative association between HDI and income inequality (Gini). Asafu-adjaye (2004) found that inequality is positively associated with poor health, measured by life expectancy and infant mortality. Reviewing 168 peer-reviewed papers, Wilkinson and Pickett (2009) also showed that about 70 of these papers find a negative association between income inequality and population health status.

Nevertheless, Worku & Woldesenbet (2015) gave a caveat that the nature or level of geographical area is of the essence when measuring income inequality. In small geographical areas, the relationship between income inequality and health outcomes is generally reported to be weak. However, income inequality was shown to be a determinant of health in metropolitan areas. Particularly, a significant negative relationship was found between inequality and life expectancy (De Vogli, 2005). Contrariwise, Worku & Woldesenbet (2015) found an insignificant association between income inequality and infant mortality rates, under-five mortality rates and maternal mortality rates.

Ramirez *et al*., (1998) examined a set of hypotheses about the causal links between economic growth and HD, from economic growth to HD which they named chain A and from HD to economic growth (chain B). As part of the independent variables, two measures of inequality were used: ratio of income share of the top to the bottom quintile and the income share of the bottom 20%. Based on a sample of 35 to 76 countries — according to the availabilty of data for some variables — between the periods of 1960 to 1992, a crosscountry ordinary least squares (OLS) estimates were obtained. Using life expectancy shortfall (a proxy for HD) as the dependent variable in chain A's model, the estimation results reported an insignificant coefficients for the two measures of inequality in relation to HD.

However, following Fosu (2002), Mohammed (2016) empirically examined the role inequality plays in the transformation of GDP growth into HD which was measured using HDI, hypothesizing a priori that inequality inhibits this transformation process. A crossectional sample of 26 sub-Saharan African countries between the years of 2000 and 2013 was used in the study.

In addressing his research questions, he adopted the Ordinary Least Squares (OLS) and Instrumental Variable (IV) regression (thus, controlling for endogeneity between HDI and GDP growth). The estimation resullts supported the basic hypothesis outlined in the study that inequality negatively influences the transformation of GDP growth into HD.

2.3 Factors Inhibiting the Transformation of Growth into HD

In relation to the aforementioned transformation process, Fosu (2002) examined one of the factors that may have impeded this transformation process. He hypothesized that the prevalence of elite political instability — an institutional environment variable — in Africa between the years of 1970 and 1985 could have inhibited the transformation of economic growth into HD in the Sub- Saharan region. The analysis was carried out in a cross- sectional framwork with 29 Sub- Saharan African countries. He found elite political instability — the frequency of coup d'état in the region— to have inhibited the transformation of growth into HD.

Following closely Fosu (2002; 2004), Mohammed (2016) investigated the effect of inequality on the translation of growth into HD. The study made use of the already- calculated Human Development Index (HDI) data for its analysis. It employed a cross-sectional Ordinary Least Squares (OLS) and Instrumental Variable techniques in its analysis for a sample size of 26 Sub-Saharan African countries. He anticipated the effect of inequality on the translation of growth into HD to be negative and had his hypothesis confirmed by the data from both econometric techniques.

But as far as Mohammed (2016) is concerned, not stripping income variable from the HDI variable brings to question the reliability of his analysis. Having an income variable in the HDI and as an independent variable is likely to cause a spurious result. Fosu (2002), for instance, made use of a non-income HD measure to ward off any issue of spurious results. Not only that, although cross-sectional data provides us the ability to compare different population at a single point in time, it may not provide us cause-and-effect-relationship. This is because it only looks at a particular point in time. But with panel data since it extends beyond a single moment in time, it helps to detect developments and changes in the features of the target population at both the group and the individual level. Studies by Schmalensee (1989) and Hsiao (2007) finds panel data analysis to provide efficient structural estimates compared with cross-sectional analysis. With this backdrop, the present study utilizes a non-income HD measure to guard against any possible spurious results and also panel data which compared with cross-sectional data gives more information, more variability, less collinearity among variables, more degrees of freedom and more efficiency in terms parameter estimates.

2.4 Conclusion

The literature review above has shed light on the relationships that might exist among poverty, inequality, economic growth and HD. The review has shown that though economic growth translates into HD, the translation depends on specific factors such as policy choices and structural factors. With emphasis on inequality, several studies have posited the potential adverse impact that inequality may have on economic growth which consequently may have a deleterious effect on HD and the translation process of economic growth into HD.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter begins by discussing the theoretical framework for the study. It then goes on to present the model, the econometric specification as well as provide a general overview of the estimation techniques. The chapter further presents on the calculation of the non-income HD measure, a comparison between HDI and the non-income HD measure and data sources and description.

3.1 Theoretical Framework

HD is the enhancement in the quality of life (e.g. Todaro, 1994; World Bank, 1991; Sen, 1981). HD may thus be achieved when the HD proxies such as literacy and health are targeted and augmented or enhanced in the face of increased economic growth. According to Ramirez *et al.,* (1998), HD is enhanced with increases in economic growth. They posit in their conceptual paper economic growth as one of the important enhancers of HD. They described this channel as chain A in their study.

A relatively limited growth-HD nexus is considered in the study, exploring the extent to which inequality affects the aforementioned nexus. Following Fosu (2002), a general transformation of growth into HD is of the form:

$$HD = h(GDPG) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1),$$

where HD is human development, h is the transformation function and GDPG is economic growth. Ramirez *et al.,* (1998) outlined a number of factors that may influence this translation process. Among these are the level of income inequality, better allocation of income by households toward HD, greater share of government allocation to HD-related social expenditure, larger contribution of social capital, and more effective human development function. (see also Adelman, 1975; Streeten, 1977; Hicks & Streeten, 1979). The functional form of the HD equation may assume a complex one but for simplicity, an HD equation linear in parameters is adopted as observed in Fosu (2002) and Fosu (2004), with equation (1) rewritten as:

$$HD = \alpha_1 + \alpha_2 GDPG + \varepsilon \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where α_1 and α_2 are coefficients and ε is an error term, α_1 is the intercept of the HD equation reflecting the impact on *HD* independently of GDPG and α_2 is the slope reflecting the translation of economic growth into HD. Pragmatically, the intercept term reflects cases such as a foreign aid received for the purpose of boosting the educational and health sector of a country which has little to do with the translation coefficient α_2 . The coefficient α_2 is expected to be influenced by the level of income inequality, better allocation of income by households toward HD, greater share of government allocation to HD-related social expenditure, larger contribution of social capital as outlined by Ramirez *et al*., (1998) or by the 'institutional environment' (Fosu, 2002; 2004). For example, most African countries have had long-standing history with high inequality levels and knowing the effects that this economic issue engenders, for example, by making accessible the benefits of growth to some selected few in an economy, economic growth's transformation into HD may be affected adversely. It is expected that countries with low levels

of inequality will have a greater proportion of their economic growth being transformed into improved quality of life.

Considering the two basic research questions outlined afore, a transference function *t* is defined, representing the coefficient of transformation of *GDPG* into *HD*. Again, for simplicity as observed in Fosu (2002), a linear transference function of the form:

$$\alpha_2 = t(\text{GINI}) = \beta_1 + \beta_2 \text{GINI} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

is adopted, where GINI denotes inequality level influencing the transference of *GDPG* into *HD*. This function allows for an interaction between *GDPG* and *GINI*. β_1 is an intercept parameter reflecting an impact of GDPG on HD exclusively of GINI. β_2 is the interactive parameter reflecting the impact of inequality in the translation of economic growth into HD. Incorporating equation (3) into equation (2) yields:

$$\text{HD} = \theta_1 + \theta_2 \text{GDPG} + \theta_3 \text{GINI} * \text{GDPG} + \theta_4 \text{GINI} + u \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where θ_1 is the intercept parameter reflecting the effect on HD exclusive of GDPG and GINI. θ_2 is the effect of GDPG on HD independent of GINI. θ_3 is the interactive effect of GDPG and GINI on HD. θ_4 is the independent effect of GINI on HD and u is the new error term. Consistent with the neo-classical analysis, θ_2 is expected to be positive as countries with bigger GDP growth have huge budget allocations and expenditures for the proxies considered in the HD measure. Since the study hypothesizes that the extent to which economic growth is translated to

HD may be hampered by inequality, we anticipate θ_3 to be negative. The sign of θ_4 cannot be determined a priori; it depends on whether GINI can affect external transfers, such as health or educational aid, that influence HD independently of GDPG as indicated in Fosu (2002).

3.2 Model Specification and Estimation Technique

In order to address the objectives set out earlier in the thesis, we adopt an extension of the model specified in equation 4 below;

$$\Delta HD_{it} = \theta_1 + \theta_2 GDPG_{it} + \theta_3 GINIGDPG_{it} + \theta_4 GINI_{it} + \theta_5 IHD_{it-1} + \mu_i + u_{it}, \ldots\ldots\ldots (5)$$

which portrays a panel data analysis structure. Where ΔHD_{it} = change in HD measure, $GDPG_{it}$ = annual GDP growth rate, $GINIGDPG_{it}$ = the interaction term between annual GDP growth rate and the Gini index, $GINI_{it}$= inequality measure, IHD_{it-1}= the initial level of the HD, μ_i = the unobserved country heterogeneity and, u_{it}= error term, with the i and t indexes representing countries and time, respectively. Linear static panel estimation techniques such as the random and fixed effect models are employed in the study. But, since theoretically, an issue of endogeneity in relation to growth and HD is likely (see, Ramirez *et al*., 1998; Ranis 2004), a dynamic panel econometric technique, which is the system Generalized Methods of Moment, is also employed to address any potential endogeneity. The essence of the IHD variable is to ascertain whether an initial level of HD does affect the rate of further improvements in HD—accounting for possible convergence.

3.3 Random and Fixed Effects Estimation Techniques

Fixed and random effects are static linear estimation techniques employed in panel data analysis. The fixed effects (FE) model help explore the association between the dependent and independent variables within a unit (country, firm etc.). These entities have their individual features that may influence the independent variable. An important assumption of the FE model is the uniqueness of the time-invariant characteristics of a particular entity which, therefore, must not be correlated with other entity characteristics (Wooldridge,2002).

Random effects (RE), unlike the fixed effects, is run on the assumption that the variation across the entities is random and not correlated with the independent variables. The RE model is utilized when the differences across units have some effect on the dependent variable (Wooldridge, 2002).

3.3.1 The Hausman Test

The choice between the RE and FE is an important issue in panel data analysis. If the individual heterogeneity is not correlated with the error term, the RE is chosen over the FE. But, if the individual heterogeneity is correlated with the error term, the FE should be preferred to the RE.

To make this decision, the Hausman Test is carried out. The null hypothesis of this test is that, "there is no correlation between regressors and the individual effects" (Hausman, 1978). A Prob>chi2 value less than 0.05 or 0.1 (i.e. significant) implies the FE should be chosen over RE.

3.4 Sytem Generalized Method of Moments (GMM)

The GMM estimation can be thought of to be a generalization of the classical method of moments. It nests the classic method of moments, linear regression, and maximum likelihood (Blundell and Bond, 1998). The classical method of moments works by using the sample moments to estimate unknown parameters. Peculiar to the system GMM estimator is that it builds a system of two equations— the original equation (the levels equation) and the transformed equation (the differenced equation). This estimator combines the moment conditions for the differenced model with those for the levels model in order to arrive at an efficient estimate for the model. Since it is less biased and more precise, it has been shown to perform better when the series are persistent (Blundell and Bond, 1998).

The motivation for the use of the system GMM estimation technique is the possible endogeneity issue as established by Ramirez et al (1998) and Ranis (2004) between the components used in obtaining the non-income HD measure and economic growth and also the inclusion of the initial level of the dependent variable to account for convergence. The system GMM works to resolve the problem of endogeneity, generating internal instruments made up of the lagged values of the endogenous regressors, i.e., GDPG and GINIGDPG instead of their current values in order to come up with efficient and unbiased estimates. These internal instruments are subjected to rigorous scrutiny based on the Hansen and Sargan tests of overidentification restrictions and autoregressive tests of orders one and two. Although the system GMM generates its own internal instruments, it is suspected that they may not fully mitigate the problem of endogeneity. With this in mind, other external instruments such as the net barter terms of trade and the initial GDP per capita are considered as well.

3.4.1 Overidentification Restrictions

The Sargan and the Hansen tests are tests of overidentifying restrictions, carried out to ascertain whether instruments are not correlated with some set of residuals. The Sargan test of overidentification becomes redundant when the robust command is used for a one-step GMM. In this instance, the Hansen statistic from the two-step estimator is used (Blundell and Bond, 1998).

The probability value (P-value) of either the Sargan or the Hansen test is compared with the significance level of 5% or 10% in order to make a decision on whether to accept the null hypothesis of valid instruments or not. A P-value of a Sargan or Hansen overidentification restrictions greater than the significance level of 5% or 10% suggests that the instruments are valid and hence exogenous (Sargan, 1958; Hansen, 1982; Blundell and Bond, 1998).

3.4.2 Autocorrelation (AR) Test

One of the important tests carried out in dynamic panel data estimation is the autocorrelation test of the residuals. The residuals of the differenced equation, by construction, might have autocorrelation but with the supposition of serial independence in the original errors, the differenced residuals should not have significant AR(2) behavior (Blundell and Bond, 1998). But, with a significant AR(2) statistic, the lags of the endogenous variables will not be suitable instruments for their current values.

The probability values (P-values) for both AR(1) and AR(2) are provided under the null hypothesis that there is no serial correlation in first-differenced errors. These P-values are compared with the level of significance of 5% or 10% in order to determine whether to accept

the null hypothesis or reject it. Since the residuals of the differenced equation, by construction, might possess AR(1), the acceptance of the presence of serial correlation depends on the P- value of the AR(2) statistic. A P-value of AR(2) greater than the level of significance (0.05 or 0.1) implies a failure to reject the null hypothesis of no serial correlation in first- differenced errors (Blundell and Bond, 1998).

3.5 Calculation of a Non- Income HD Measure

Following Fosu (2002), the anticipation of a spurious correlation — that is, having gross national income (GNI) per capita (PPP) in HDI and having an income variable (GDPG) comparable to it as an independent variable — has necessitated the calculation of the non-income HD measure. The calculation of the non-income HD measure follows similar derivations as observed in the HDI calculation HDR (2016), only that this measure is obtained arithmetically using two key dimensions of HD, that is, education and life expectancy at birth. Thus, though the definition of HD allows for several indicators, the study limits itself to redefining HD of a country as the health and education of the citizenry which, essentially, is a reductionist interpretation.

Following HDR (2016), minimum and maximum values were set in order to transform the indicators of the HD measure expressed in different units into a scale of 0 to 1. The minimum and maximum values served as the 'natural zeros' and 'aspirational targets', respectively, from which component indicators were normalized. The minimum and maximum vales for life expectancy were 20 years and 85 years, respectively. Education has two components, expected and mean years of schooling. The minimum and maximum values for expected years of schooling were 0 and 18 years while that of mean years of schooling were 0 and 15 years (see

HDR (2016) for the justification of the minimum and maximum values for these variables). The dimension indices, that is, life expectancy and education index were calculated as:

$$\text{Dimension index} = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$$

Since the dimension of education has two components, the above equation is applied to both of them and then an arithmetic mean of the two resulting indices is taken to arrive at the education index.

The non-income HD measure is obtained by taking an arithmetic mean of the life expectancy and education index. That is,

$$\text{non-income HD measure} = 0.5LEI + 0.5EI \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where LEI = Life expectancy index and EI = Education index. See appendix, section A, for the data on the non-income HD measure.

3.6 Comparison of HDI and Non-Income HD Measure

A comparison is carried out to ascertain how the non-income HD measure has fairly progressed over time and also reveal some discrepancies for certain countries at some points in time. Data on the two measures of HD for the years 1980 and 2010 are used for the comparison, though computations were made for the intervening years 1985, 1990 and 1995 as well. HDI data for 1980, 1985, 1990, 1995 and 2000 is sourced from HDR (2005). The remaining HDI data, that is,

2005, 2010 and 2015 are sourced from HDR (2007/8), HDR (2010) and UNDP database (hdr.undp.org/data), respectively. The graphs for the HD measures are presented below for countries with data for both measures in 1980 and 2010.

3.6.1 HDI and non-income HD Measure for 1980

The HDI averaged 0.448 with a minimum of 0.252 (Niger) and a maximum of 0.674 (South Africa). The non-income HD measure averaged 0.383 with a minimum of 0.190 (Niger) and 0.571 (Mauritius). It appeared that Niger with or without the income component performed poorly on HD in 1980. It is also apparent that Niger had a higher HDI value because of the inclusion of the income component. But the country with the maximum value changed in respect of both measures. South Africa placed first with HDI while Mauritius placed first with the non-income HD measure, suggesting that Mauritius had a substantially higher life expectancy and education index compared with South Africa.

Some countries were much better placed by the HDI compared with the non-income HD measure. Countries like Tunisia, Niger, DR. Congo, Cote d'Ivoire, and Botswana considering the exclusion of the income component did not do well on HD, comprising life expectancy at birth and education.

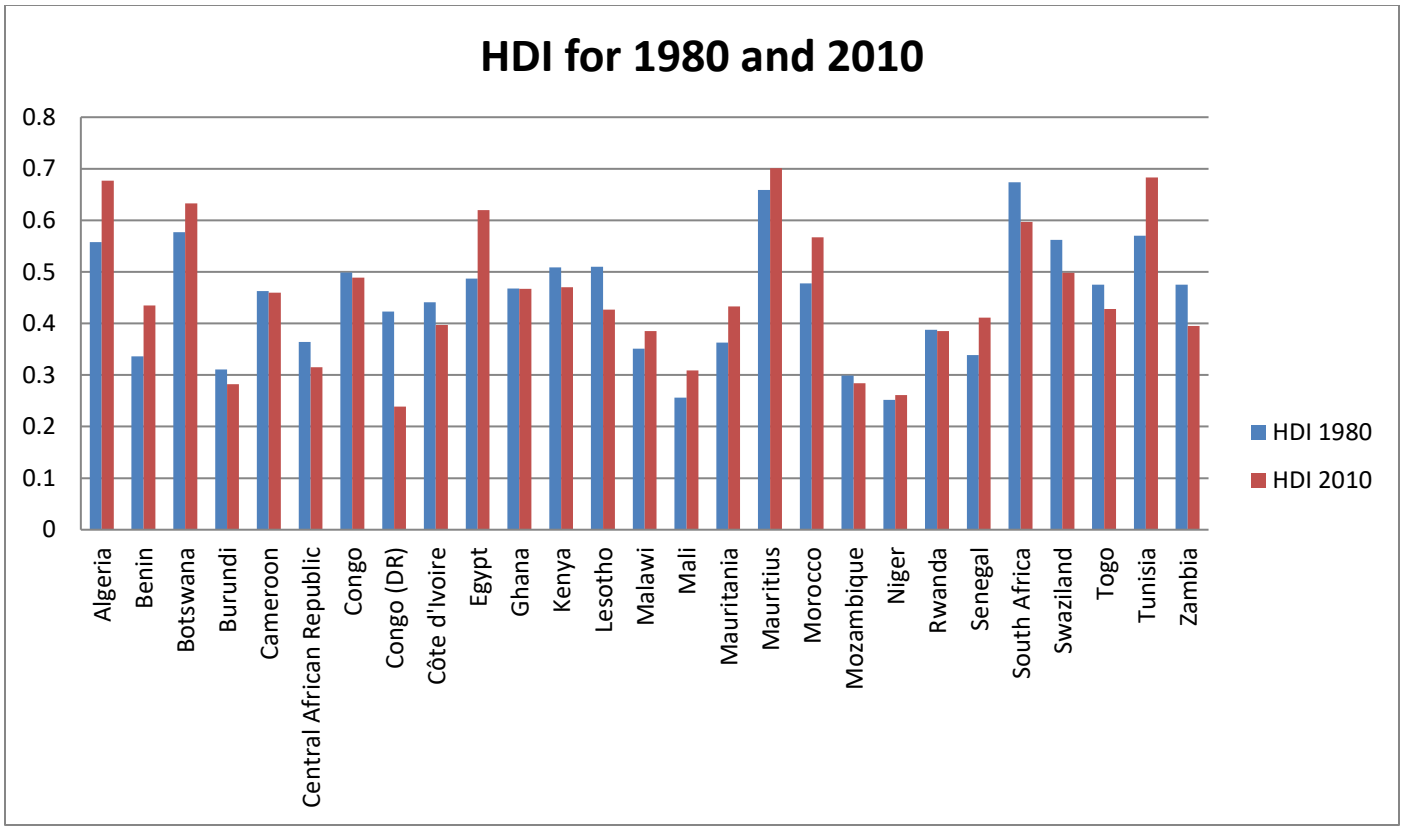

Figure 1

3.6.2 HDI and non-income HD Measure for 2010

Considering Figure 2, the non-income HD measure rose faster for most countries. This could be indicative of the fact that countries became conscious of ensuring that increased income are channeled into HD-centered commodities which consequently will have positive implications for HD and sustained economic growth in general.

The non-income HD measure averaged 0.523 with a minimum of 0.358 (Chad) and a maximum of 0.753 (Mauritius). The HDI averaged 0.437 with a minimum of 0.239 (DR Congo) and a maximum of 0.701(Mauritius). Mauritius maintained her position in respect of both measures as the country with the maximum value but the country with the minimum values for both measures changed. Chad had an appreciable income which placed her higher than DR Congo in the HDI

context. But considering the non-income HD measure, regardless of the appreciable income of Chad compared with DR Congo, DR Congo fairly advanced in the other dimensions of HD — that is, education and life expectancy. Countries like Mozambique, DR Congo, Mali, Liberia, and Burundi were negatively affected by the income component of the HDI, resulting in their respective low HDI. Nevertheless, these countries were not encumbered by the state of their incomes though some other factors might have contributed to the appreciable levels of their HD measure through, for example, foreign aid focusing directly on HD areas in some of the countries.

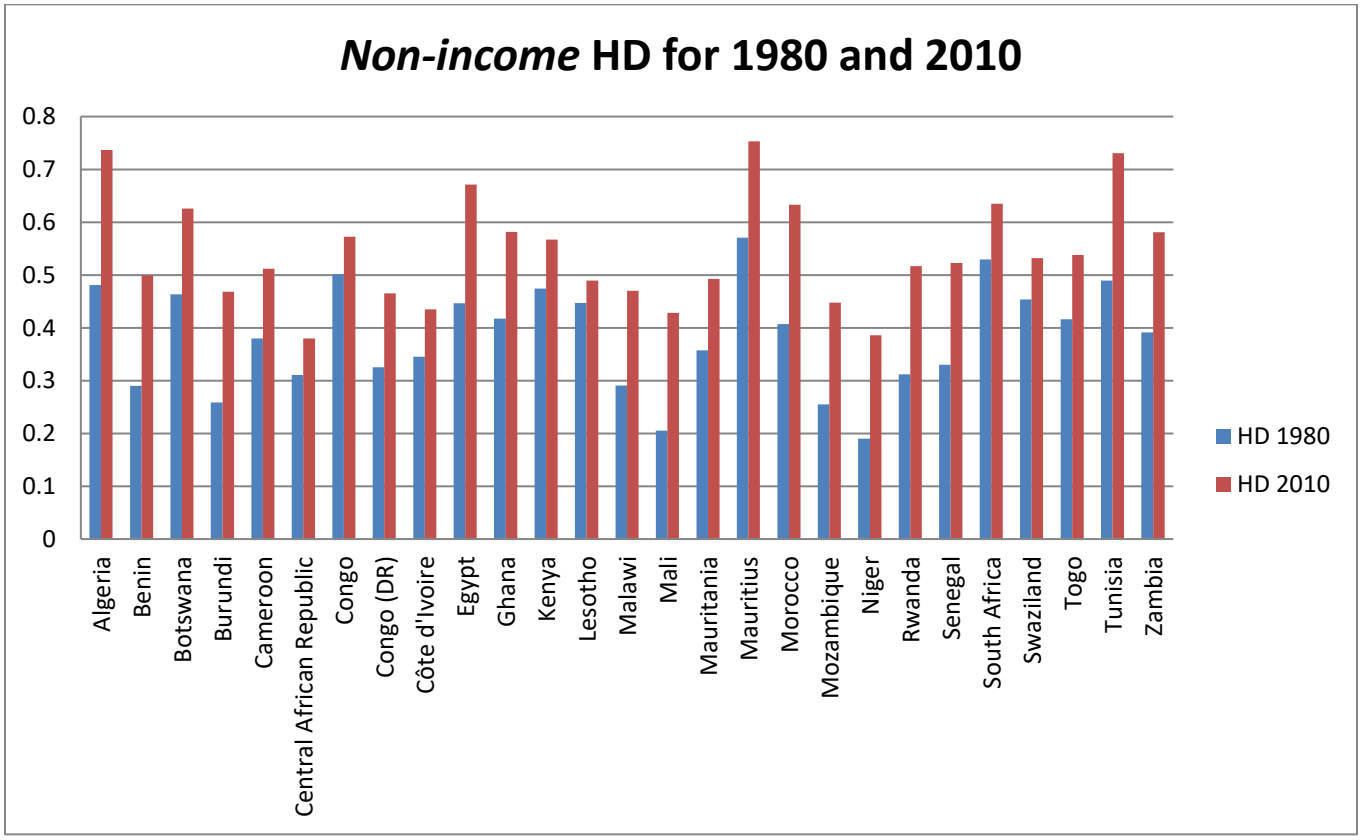

Figure 2

3.6.3 Concluding Remarks

HDI had been consistently higher than the non-income HD measure since 1980 for all countries except Congo—who maintained higher non-income HD value for both periods compared with her HDI values— until 2010 where all but Botswana, had their non-income HD rising faster than the HDI. In all these years, Niger and Chad commonly were the countries assuming the lowest position for both measures of HD signifying their slackness, compared to other countries, in enhancing HD among its citizenry. The non-income HD measure from an average of 0.383 in 1980 rose faster in the course of the period by about 37% compared with the HDI which averagely declined by about 2.5%. The decline of the HDI is hardly plausible as Fosu and Mwabu (2010) found 2005 HDI to have averagely soared higher compared to 1980 HDI for African countries with an increment of about 21.96%. This decline may be attributed to difference in sample composition. For example, HDI data for 2010 comprised 39 African countries while 1980 HDI data covered 27 African countries. The variations in the number of countries may have resulted in the lower average for 2010 compared with 1980.

The respective figures have consistently showcased that some countries have been well placed by the HDI because of the inclusion of the income component. They have also shown that some countries irrespective of the income level, HD — in terms of education and life expectancy— became very pronounced. Although this may be partly explained by foreign aid, transfers and remittances, among other factors received by countries to be spent mainly on HD-related commodities, some countries perhaps grew conscious of channeling their increased income in HD-related areas. Further, considering, for the past decade, the insistent advocacy of the MDGs

(now, SDGs) by the United Nations, various African governments have been awakened to the importance of HD to a holistic development as individual countries and as a continent.

3.7 Data Description

The study uses data for 39 African countries. The limited number of countries considered (39 out of 54 African countries) is basically due to most countries not having data for most of the variables, especially within the time frame defined by the study: 1980-2015. The variables of interest are explained below together with the source from which data is obtained. Angola, Sudan, Libya, Equitorial Guinea, Gabon, Zimbabwe, South Sudan, Sierra Leone, Seychelles, Somalia, Djibouti, Carbo Verde, Comoros, Eritrea and Sao Tome and Principe barely have data for most of the variables of interest and hence are dropped.

3.7.1 Human Development Measure (HD)

As already presented, the data for HD, the dependent variable, is calculated in a similar manner like the HDI developed by the United Nations (1990, 1991), but without the income component — as in Fosu (2002). The HD measure for the study includes only the life expectancy at birth and education in order to avoid potential spurious correlation resulting from income being a part of HDI and also appearing as an independent variable (for details, see Fosu, 2002). The sources of data for life expectancy at birth and the educational index are World Development Indicators (http://www.worldbank.org/data/) and the UNDP database (hdr.undp.org/en/content/education-index), respectively. After obtaining the data for the HD measure, a difference for every five-year period is obtained, for example, 1980 HD value is subtracted from 1985 HD value to obtain a change in the HD measure (ΔHD).

3.7.2 Inequality Measure (GINI)

A main independent variable of the study is income inequality measured by the Gini coefficient. Data for this variable is sourced from the World Development Indicators (http://www.worldbank.org/data/). Almost all the countries have inconsistent time series data for the Gini coefficient, but those countries without enough GINI data points are not considered. An average for every five-year period corresponding to the various five- year intervals for ΔHD is obtained for the GINI data. This is adopted, in part, because the level of inequality within countries has less variation over time and also because of missing data for the Gini coefficient (see Dorn et al., 2018).

3.7.3 Economic Growth Measure (GDPG)

Economic growth, an independent variable, is measured as the mean annual growth rate of Gross Domestic Product. The data is sourced from the World Bank WDI database (http://www.worldbank.org/data/). But since GDPG is likely to be endogenous, the net barter terms of trade and the initial GDP per capita, both sourced from the World Bank WDI database (http://www.worldbank.org/data/), are used as instruments for it in addition to the internal instruments built by the system GMM estimator. Consistent with the GINI variable, five-year averages are obtained for GDPG and the net barter terms of trade, in correspondence with the ΔHD.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF REGRESSION RESULTS

4.0 Introduction

This chapter presents summary statistics of the dependent and independent variables and a detailed discussion of the findings based on the econometric model specified in chapter three. The section looks at the empirical estimation for both measures of human development (ΔHD measure and ΔHDI) based on the random effects, fixed effects and the system GMM. Finally, results of both measures are compared to tease out the significant differences and similarities.

4.1 Descriptive Analysis

In this section, a brief description of the statistical characteristics of the variables of interest used in the model — ΔHD, ΔHDI, GDPG and GINI — is given based on the mean, standard deviation, maximum and minimum values over the period 1980 to 2015. The differences in the numbers of observations among the variables are because most countries have missing data for some time periods, thus rendering our panel data an unbalanced one.

From the summary statistics reported in Table 2, ΔHD averaged 0.031, but ranged between -0.341 (Rwanda) and 0.172 (Rwanda) while ΔHDI averaged 0.012 over the period with a range between -0.196 (Gambia) and 0.196 (DR Congo). The GDPG variable averaged 3.73% over the period, with Liberia being the country with the maximum and minimum values of GDPG. In the case of GINI, an average of 43.95% was recorded over the entire period, with Algeria and Malawi being countries with the maximum and the minimum values, respectively.

Table 2: Summary Statistics

Variables	Observations	Mean	Std. Dev.	Min.	Max.
GDPG	271	3.73	3.94	-26.56	32.45
GINI	164	43.95	8.20	27.6	65.8
ΔHDI	234	0.012	0.058	-0.196	0.196
ΔHD	241	0.028	0.038	-0.341	0.172

Source: Author's computation using Stata 14.

Note: ΔHDI is the change in HDI for every five-year period, ΔHD is the change in the HD measure for every five-year period, GDPG is the annual GDP growth and GINI is the measure of income inequality. Both GDPG and GINI are five-year averages consistent with the period for which HD changes are computed.

4.2 Estimation Results for non-income HD measure and HDI

This section provides RE, FE and GMM results for the non-income HD and HDI, based on estimating the above equations. The results are reported in tables 3-5 for the non-income HD, and tables 6-8 for HDI. The system GMM result is the ideal estimation result for the study compared with the random and fixed effect estimation techniques—due to the probable endogeneity between economic growth and the components of the HD proxies— though they are discussed side by side with it. The standard error of estimate (SEE) is used in determining among the significant models, the appropriate models for the study as it provides a good justification of a model's goodness of fit. The closer SEE is to zero, the better the goodness of fit. Also Hausman test is carried for the respective models with the probability value for the Hausman test statistic reported under the random effect results table for both dependent variables (non-income HD measure and HDI)

4.2.1 Estimation results for non- income HD based on RE, FE and GMM Model

GINI: Revisiting the research objectives of the paper, thus research objective 2, we were interested in finding the independent effect of inequality, GINI, on ΔHD. Models 3, 4, 7, 8 and 9 provide estimates for this effect. Since the Hausman test rejects random effect results for all models that considered the GINI variable, we consider only the system GMM and fixed effects results. Generally, across the two techniques, inequality showed a negative and statistically significant relationship with ΔHD. This is reported in models 3, 4, 7, and 8 of FE and models 3 and 4 of the system GMM results. Results from both techniques are quite comparable in terms of the magnitude of the coefficient of the GINI variable as the system GMM model 3 predicts a 0.0021 adverse effect on ΔHD while model 7 of the fixed effect predicts a 0.0024 adverse effect on ΔHD when GINI goes up by 1%, holding all other variables constant. The adverse impact on ΔHD with a rise in inequality (GINI) sides with the concern raised in the HDR (2005) that inequality may have a negative influence on human capabilities.

GINIGDPG: This variable is intended to reveal the effect of inequality on HD through economic growth. The variable was introduced in models 5, 6, 7, 8 and 9. Considering the Hausman P-value on the random effect results table, fixed effect is preferred over random effect in all models that featured the interaction variable. The GINIGDPG reports a significant negative relationship with ΔHD in models 5, 6 and 9 of FE result and model 5 of system GMM result. Unlike the system GMM, FE result provides unimpressive coefficient for the GINIGDPG variable. That is, while the system GMM result (Model 5) predicts that on average, holding all other variables constant, a 1% percent increment in GINIGDPG is associated with 0.0011 decreases in ΔHD, the FE results predict a 0.0004 (Models 5 and 6) negative impact on ΔHD.

Intuitively, this implies that given a higher level of inequality in a country, the rate at which economic growth could be translated into HD may be significantly eroded. This finding supports the advancement made by Ranis (2004) and Ramirez *et al*., (1998; 2000) that economic growth-HD nexus depends on other factors. To appreciate the actual impact of GINI on HD, a partial differential of the system GMM model 5 is taken with respect to GINI:

$$\frac{\partial \Delta HD}{\partial GINI} = -0.0011GDPG, \qquad \text{taking the overall average of GDPG} = 3.73,$$

$$\frac{\partial \Delta HD}{\partial GINI} = -0.0011(3.73) = -0.004103$$

This mathematical presentation shows that, on average, a 1% percent increase in GINI hampers ΔHD by about 0.004, which is higher compared with the independent adverse effect of GINI on ΔHD in the system GMM models 3 and 4.

GDPG: From the Hausman P-value reported on the random effect result, FE result is used for model 5 and 6 while RE result is used for model 4. Based on the results under the various econometric techniques (with system GMM inclusive), economic growth (GDPG) is found to positively affect HD, supporting earlier findings (HDR, 1996; Ramirez *et al*., 1998; Sen, 1999; Fosu, 2002; Ranis, 2004). Considering model 1 which features only GDPG, system GMM among the econometric techniques shows GDPG to positively and significantly influence HD. That is, should GDPG go up by 1%, ΔHD will increase by about 0.0062. Nevertheless, GDPG shows a positive and significant relationship with HD in other models across the different estimation techniques. Under RE results, GDPG shows a positive and significant relationship

with ΔHD in model 4. Under the FE results, models 5 and 6 report GDPG to have a positive and significant impact on ΔHD.

IHD: The coefficient of the initial level of HD recorded a significant negative impact on the ΔHD indicating convergence across the various estimation techniques in models 6 and 9 of FE, model 4 of RE and models 4, 6, and 9 of system GMM results. Thus, the negative significant relationship indicated by the IHD variable suggests that attainments of higher levels of HD are inhibited by initial levels of HD. From the system GMM results, model 4, a 1% percent increase in the initial level of HD is associated with about a 0.15 decrease in ΔHD.

Table 3: RE results with change non-income HD measure as the dependent variable.

Variables	MODEL1	MODEL2	MODEL3	MODEL4	MODEL5	MODEL6	MODEL7	MODEL8	MODEL9
GDPG	0.0009	0.0008	0.0030***	0.0034***	0.0077***	0.0072**		0.0004	0.0036
	(0.0009)	(0.0009)	(0.0007)	(0.0006)	(0.0026)	(0.0028)		(0.0041)	(0.0046)
GINI			-0.0007**	-0.0005*			-0.001***	-0.0009**	-0.0005
			(0.0003)	(0.0003)			(0.0003)	(0.0005)	(0.0004)
GINIGDPG					-0.0001**	-0.0001	0.0001	0.0001	-0.0083
					(0.0001)	(0.0001)	(0.00001)	(0.0001)	(0.0001)
IHD		-0.0164		-0.0461***		-0.0469***			-0.0461***
		(0.0193)		(0.0132)		(0.0141)			(0.0134)
CONS.	0.0245***	0.0313	0.0487***	0.0575***	0.0196***	0.0372***	0.6202***	0.0601**	0.0568
	(0.0038)	(0.0901)	(0.0125)	(0.0156)	(0.0030)	(0.0069)	(0.0129)	(0.0232)	(0.0210)
Observations	240	202	147	135	147	135	147	147	135
Countries	39	39	39	38	39	38	39	39	38
Prob>Chi2	0.3080	0.4857	0.0000	0.0000	0.0001	0.000	0.0000	0.000	0.0000
R-sq.									
Within	0.0066	0.0057	0.0564	0.1044	0.0512	0.1160	0.0473	0.0485	0.1052
Between	0.1366	0.1246	0.1948	0.3676	0.1601	0.3256	0.2218	0.2185	0.3657
Overall	0.0097	0.0086	0.1064	0.1459	0.0927	0.1418	0.1079	0.1080	0.1459
Hausman Test	0.7633	0.9612	0.0069	0.1108	0.0049	0.0276	0.0040	0.0017	0.0259
SEE	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002

Source: Author's computation using Stata 14. ***** p<0.01, ** p<0.05, * p<0.1 (Level of Significance)**
Standard errors are in parenthesis

Table 4: FE results with change non-income HD measure as the dependent variable.

Variables	MODEL1	MODEL2	MODEL3	MODEL4	MODEL5	MODEL6	MODEL7	MODEL8	MODEL9
GDPG	0.0008	0.0008	0.0016	0.0034**	0.0202***	0.0227***		0.0115	0.0189**
	(0.0009)	(0.0011)	(0.0014)	(0.0016)	(0.0063)	(0.0059)		(0.0072)	(0.0075)
GINI			-0.0023***	-0.0020***			-0.0024***	-0.0014**	-0.0006
			(0.0007)	(0.0006)			(0.0007)	(0.0008)	(0.0007)
GINIGDPG					-0.0004***	-0.0004***	0.00003	-0.0002	-0.0003**
					(0.0001)	(0.0001)	(0.00003)	(0.0002)	(0.0001)
IHD		-.0002		-0.1125**		-0.1210**			-0.1216**
		(0.0620)		(0.0461)		(0.0464)			(0.0471)
Const.	0.0250***	0.0243	0.1272***	0.1539***	0.0236***	0.0665***	0.1340***	0.0865**	0.0953**
	(0.0036)	(0.0272)	(0.0336)	(0.0397)	(0.0067)	(0.0197)	(0.0309)	(0.0367)	(0.0372)
Observation	240	202	147	135	147	135	147	147	135
Countries	39	39	39	38	39	39	39	39	35
Prob>F	0.4026	0.7687	0.0014	0.0049	0.0075	0.0023	0.0013	0.0054	0.0048
R-sq:									
Within	0.0066	0.0061	0.1200	0.1437	0.1152	0.1695	0.1159	0.1331	0.1727
between	0.1366	0.0676	0.0572	0.2038	0.0375	0.1689	0.0513	0.0457	0.1652
overall	0.0097	0.0066	0.0582	0.1046	0.0496	0.1045	0.0573	0.0547	0.1016
SEE	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003

Source: Author's computation using Stata 14. ***** p<0.01, ** p<0.05, * p<0.1 (Level of Significance)**

Standard errors are in parenthesis

Table 5: Two-step System GMM results with change non-income HD measure as the dependent variable.

Variables	MODEL1	MODEL2	MODEL3	MODEL4	MODEL5	MODEL6	MODEL7	MODEL8	MODEL9
GDPG	0.0062***	0.0035**	0.0126**	0.0038**	0.0416*	0.0298	0.0074		0.0050
	(0.0022)	(0.0015)	(0.0049)	(0.0017)	(0.0251)	(0.0222)	(0.0123)		(0.0414)
GINI			-0.0021**	-0.0014***			-0.0022	-0.0015	-0.0039
			(0.0008)	(0.0004)			(0.0014)	(0.0009)	(0.0044)
GINIGDPG					-0.0011*	-0.0006	-0.0001	-0.0130	-0.00005
					(0.0006)	(0.0006)	(0.0002)	(0.0001)	(0.0011)
IHD		-0.0032				-0.1243**			-0.1619**
		(0.0251)		-0.1495***		(0.0551)			(0.0791)
CONS.	0.0053	0.0159	0.0697**		0.0485***	0.0765**	0.1079*	0.0976***	0.2587
	(0.0085)	(0.0123)	(0.0277)	0.1426***	(0.0086)	(0.0369)	(0.0628)	(0.0326)	(0.0792)
				(0.0377)					
Observations	230	195	147	135	147	135	147	147	135
Countries	38	38	39	38	39	38	39	39	38
Instruments	7	27	10	24	11	21	35	8	17
Model's P-value	0.005	0.05	0.016	0.00	0.016	0.053	0.032	0.029	0.247
AR1 P-value	0.023	0.052	0.035	0.099	0.014	0.077	0.033	0.051	0.078
AR2 P-value	0.347	0.532	0.173	0.240	0.160	0.154	0.057	0.046	0.199
Sargan P-value	0.752	0.175	0.358	0.136	0.408	0.029	0.110	0.412	0.170
Hansen P-value	0.165	0.209	0.653	0.381	0.444	0.419	0.491	0.573	0.503
SEE	0.003	0.003	0.002	0.002	0.003	0.002	0.002	0.002	0.002

Source: Author's computation using Stata 14. ***** p<0.01, ** p<0.05, * p<0.1 (Level of Significance)**

Standard errors are in parenthesis

4.2.2 Estimation results with change in HDI based on RE and GMM Model

Since the estimation results on ΔHDI is mainly for comparison with the non-income HD results, the key independent variables, GINI and GINIGDPG are discussed. Further, the RE results is preferred to the FE results based on the Hausman test. Thus, results discussion are presented under the RE results and system GMM.

GINI: From the RE model, GINI shows a significant negative relationship with ΔHDI in all the models. For instance, RE results Model 9 predicts a 0.0016 decreases in ΔHDI should GINI go up by 1 percent, holding all other variables constant. System GMM results report none of the coefficient of GINI variable as being significant.

GINIGDPG: The coefficient of the GINIGDPG reports significant inconsistent relationships with HD across the two techniques. For instance, models 6 and 7 of RE model report GINIGDPG's coefficient as having a positive significant relationship with ΔHDI while the system GMM, model 8— chosen due to its lower SEE— reports the coefficient to have a significant negative relationship with ΔHDI. Results from the system GMM is preferred over the static panel estimator (RE) due to the probable occurrence of endogeneity. Model 8 of the system GMM predicts that a 1% percent increment in GINIGDPG is associated with about 0.0045 decreases in ΔHDI, holding all other variables constant. To ascertain the actual impact of inequality on HD, a partial differentiation of ΔHDI with respect to GINI is derived. And by making use of the mean of the GDPG (3.73) provided under the descriptive statistics, a value of -0.016 is obtained. Thus, ΔHDI is inhibited by about 0.016% when inequality increases by 1 percent, holding all other variables constant.

Table 6: RE results with change in HDI measure as the dependent variable

Variables	MODEL1	MODEL2	MODEL3	MODEL4	MODEL5	MODEL6	MODEL7	MODEL8	MODEL9
GDPG	0.0030***	0.0035***	0.0030**	0.0023	0.0081**	0.0095**		-0.0033	-0.0030
	(0.0007)	(0.0011)	(0.013)	(0.0014)	(0.0036)	(0.0037)		(0.0058)	(0.0060)
GINI			-0.0008**	-0.0011***			-0.0011***	-0.0014**	-0.0016***
			(0.0003)	(0.0003)			(0.0003)	(0.0006)	(0.0006)
GINIGDPG					-0.0001	0.0002**	0.0001***	0.0001	0.0001
					(0.0001)	(0.0001)	(.00003)	(0.0001)	(0.0001)
IHDI		-0.0277		-0.0171		-0.0224			-0.0170
		(0.0264)		(0.0220)		(0.0233)			(0.0215)
CONS.	0. 0006	0.0150	0.0364**	0.0631***	-0.0006	0.0175	0.0494***	0.0638**	0.0858
	(0.0036)	(0.0101)	(0.0168)	(0.0165)	(0.0058)	(0.0118)	(0.0152)	(0.0286)	(0.0297)
Observations	234	187	148	131	148	131	148	148	131
Countries	39	38	38	37	38	37	38	38	37
Prob>Chi2	0.0000	0.0073	0.0014	0.0003	0.0226	0.0341	0.0005	0.0003	0.0002
R-sq.									
Within	0.0153	0.0346	0.0001	0.0006	0.0004	0.0010	0.0000	0.0000	0.0003
Between	0.0869	0.0163	0.3072	0.1872	0.3161	0.1403	0.2980	0.2767	0.1939
Overall	0.0209	0.0257	0.0267	0.0353	0.0202	0.0260	0.0281	0.0286	0.0367
Hausman Test	0.8395	0.1384	0.2694	0.6041	0.2336	0.6737	0.2851	0.4608	0.7049
SEE	0.004	0.005	0.006	0.006	0.006	0.006	0.006	0.006	0.006

Source: Author's computation using Stata 14. ***** p<0.01, ** p<0.05, * p<0.1 (Level of Significance)**
Standard errors are in parenthesis

Table 7: FE results with change in HDI measure as the dependent variable

Variables	MODEL1	MODEL2	MODEL3	MODEL4	MODEL5	MODEL6	MODEL7	MODEL8	MODEL9
GDPG	0.0028***	0.0048***	0.0001	0.0017	-0.0043	-0.0011		-0.0073	0.0023
	(0.0008)	(0.017)	(0.0020)	(0.0026)	(0.0066)	(0.0080)		(0.0109)	(0.0147)
GINI			0.0002	0.0005			0.0002	-0.0005	0.0006
			(0.0008)	(0.0009)			(0.0008)	(0.0013)	(0.0017)
GINIGDPG					0.0001	0.0001	0.0076	0.0002	-0.00001
					(0.0001)	(0.0001)	(.00004)	(0.0002)	(0.0003)
IHDI		0.1221*		0.1530		0.1506			0.1520
		(0.0642)		(0.0160)		(0.1112)			(0.1104)
Const.	0.0014	-0.0611**	0.0024	-0.0878	0.0128	-0.0626	0.0018	0.0349	-0.0902
	(0.0034)	(0.0298)	(0.0378)	(0.0795)	(0.0085)	(0.0534)	(0.0475)	(0.0603)	(0.0924)
Observation	234	187	148	131	148	131	148	148	131
Countries	39	38	38	37	38	37	38	38	37
Prob>F	0.0024	0.0038	0.9476	0.4493	0.8063	0.4621	0.9526	0.9114	0.6130
R-sq									
Within	0.0153	0.0481	0.0003	0.0131	0.0014	0.0125	0.0003	0.0019	0.0131
Between	0.0869	0.1122	0.1344	0.0531	0.1220	0.0373	0.0652	0.0738	0.0542
Overall	0.0209	0.0011	0.0150	0.0083	0.0064	0.0057	0.0073	0.0005	0.0084
SEE	0.004	0.006	0.007	0.007	0.007	0.007	0.007	0.007	0.007

Source: Author's computation using Stata 14. ***** p<0.01, ** p<0.05, * p<0.1 (Level of Significance)**
Standard errors are in parenthesis

Table 8: Two-step System GMM results with change in HDI measure as the dependent variable

Variables	MODEL1	MODEL2	MODEL3	MODEL4	MODEL5	MODEL6	MODEL7	MODEL8	MODEL9
GDP	0.0034**	0.0036	0.0014	0.0028	0.1749*	0.0288		0.1895**	0.0870
	(0.0016)	(0.0023)	(0.0029)	(0.0043)	(0.1026)	(0.0585)		(0.0884)	(0.1042)
GINI			-0.0012	-0.0016			-0.0104	0.0113	0.0010
			(0.0024)	(0.0020)			(0.0076)	(0.0114)	(0.0128)
GINIGDP					-0.0042*	-0.0013	-0.0004	-0.0045**	-0.0030
					(0.0022)	(0.0017)	(0.0006)	(0.0020)	(0.0028)
lHDI	-0.0007	0.3704***		0 .1297		0.3841			0.2645
	(0.0077)	(0.1135)		(0.0934)		(0.4427)			(0.3914)
CONS.		-0.1678***	0.0552	0.0156	0.0575	-0.0340	0.5388	-0.4358	0.0463
		(0.0550)	(0.1138)	(0.1186)	(0.0753)	(0.2709)	(0.3778)	(0.5430)	(0.6318)
Observations	226	187	148	131	148	131	148	148	131
Countries	38	38	38	37	38	37	38	38	37
Instruments	30	28	25	24	15	19	10	16	20
Model's P-value	0.039	0.003	0.603	0.156	0.059	0.020	0.375	0.020	0.000
AR1 P-value	0.000	0.000	0.000	0.000	0.051	0.076	0.041	0.066	0.032
AR2 P-value	0.071	0.120	0.351	0.316	0.987	0.693	0.620	0.791	0.875
Sargan P-value	0.000	0.000	0.002	0.000	0.780	0.180	0.077	0.805	0.423
Hansen P-value	0.291	0.244	0.317	0.634	0.798	0.345	0.149	0.706	0.526
SEE	0.004	0.005	0.006	0.006	0.011	0.008	0.007	0.009	0.012

Source: Author's computation using Stata 14. ***** p<0.01, ** p<0.05, * p<0.1 (Level of Significance)**
Standard errors are in parenthesis

4.3 Concluding Remarks

Comparing results for ΔHD and ΔHDI specifications based on RE, FE and system GMM, some striking similarities and differences were discerned. The independent effect of inequality showed much consistency generally in its relationship with HD for both HDI and non-income HD across the estimating techniques considered. A significant difference found was the underlying assumption individual heterogeneity. Whereas the Hausman test chose FE, which suggests that the differences across the countries have no influence on ΔHD, as the appropriate model for the ΔHD measure model, RE result was sanctioned for the ΔHDI model based on the Hausman test, also suggesting that the differences that exist across the countries have influence on ΔHDI. Also, there was no statistically significant coefficient reported for the GINI variable with ΔHDI as the

dependent variable under the system GMM which was not the case with ΔHD as the dependent variable.

With the interaction term, GINIGDPG, the FE result under the ΔHD specification was considered while RE under the ΔHDI specification was considered based on the Hausman test. Reports from these estimation types revealed an inconsistent relationship with human development. Negative and positive significant relationships are recorded for ΔHD (model 5) and ΔHDI (model 6 and 7) specifications, respectively. Again, adopting the FE result under the ΔHD specification suggests that differences across countries have no influence on ΔHD. The converse holds for the adoption of RE for the ΔHDI specification. The system GMM results show consistency in the direction with which the interaction term affects human development. Both HD measures' results recognize the adverse impact of inequality on the translation of economic growth into HD. This finding appears tenable as it supports recent developments in the HDRs in relation to inequality and HD attainment. These reports posit the prevalence and persistence of inequality to be one of the major encumbrances to the attainment of HD in several parts of the developing world (HDR, 1990; 2001; 2005; 2010; 2015). Specifically, HDR (2015) posits that developing countries with dwindling HD levels are those with substantial majority of households—above 75% of the population— living in a society where income is more unevenly distributed than it was in the 1990s.

In relation to economic growth (GDPG), results from both HD measures across the various techniques support the idea of economic growth enhancing HD as observed in several empirical

papers (See, Ramirez et al., (1998), Fosu, 2002:2004; Ranis, 2004; Venables, 2006; Mohammed, 2016).

The case of convergence was pronounced in almost all models across the various estimation techniques in relation to ΔHD, unlike the case of HDI that shows no evidence of convergence in the attainment of human development.

CHAPTER FIVE

SUMMARY AND POLICY RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary and conclusion of the entire study. It also recommends some policies based on the study's findings.

5.1 Summary

HD is fundamental to poverty eradication, sustained economic growth and social development. However, HD is dependent on economic growth. Economic growth, among other factors, has been acknowledged to play an instrumental role in enhancing HD (Sen, 1999; HDR, 2005). However, several factors have also been observed to be important determinants of HD: the level of income inequality, better allocation of income by households toward HD, greater share of government allocation to HD-related social expenditure, larger contribution of social capital, and the institutional environment (Adelman, 1975, Streeten, 1977; Hicks & Streeten, 1979; Ramirez et al, 1998; Fosu, 2002:2004; Ranis, 2004).

The present thesis focused on inequality (see, Ranis, 2004, Ramirez et al, 1998:2000) and the translation of economic growth into HD by considering the ensuing research objectives (i) the effect of inequality on the translation of economic growth into HD (ii) the independent effect of inequality on HD, since when such a study was carried out by Ramirez et al (1998), the result was not consistent with their anticipation, i.e. a more uniform distribution did not matter in the advancement of HD.

Following Fosu (2002), the thesis utilized data on HD indicators (education and life expectancy) to obtain a non-income HD measure for 39 African countries from 1980 to 2015. The study then systematically compared the computed HD measure with the UNDP HDI measure, revealing some discrepancies for certain countries at some points in time. The study then estimated an HD model based on Fosu (2002), involving the Gini coefficient as a measure of inequality, annual GDP growth rate, and initial HD. A model with HDI was also estimated for comparison.

A theoretical framework developed by Fosu (2002) which allows for an interaction between the inequality (GINI) and economic growth (GDPG) was used with the objective of finding the effect of inequality on the translation of economic growth into HD. The study employed static linear panel data estimation techniques, that is, RE and FE models and a system GMM econometric technique — a dynamic panel technique which addresses endogeneity.

Results from the system GMM estimation (which is preferred to the RE and FE results because of its ability to address possible endogeneity) revealed, a significant negative impact of the interactive variable (GINIGDPG) on non-income HD. That is, inequality interactively enters with negative consequences on HD. This finding addresses the first objective of the study. The second objective is also addressed as the estimation revealed that inequality has an independent adverse effect on HD.

5.2 Policy recommendations

From the above findings, a significant conclusion drawn from the study is for African countries to direct much attention to reducing the level of inequality as that will ensure the effectiveness of

the transformation of economic growth into HD. One of the important means to address this challenge is by ensuring inclusivity at all fronts. Although this remedy has the potency to reduce inequality, it requires the commitment and the unrelenting efforts of African governments to ensure that its positive effects on HD are realized. A very significant medium through which a country can ensure inclusivity is when policy-makers ensure that policies that are meant to generate growth simultaneously considers how the proceeds of the growth generated could be assessed by majority of the populace.

Inclusive growth is seen as a much broader concept which unites the missing link between economic growth and HD. Inclusive growth is capable of sustaining multifaceted social well-being such as health and education (UNDP, 2014). Ranieri and Ramos (2013) associate inclusive growth with improvement of people's standard of living. And one of the key channels through which the standard of living of the populace could be raised is when economic growth comes with massive employment in most sectors of the economy. Economic growth in Africa has tended to be either sector- specific or geographically specific and so the proceeds of growth find or benefit a few in the economy. This goes a long way to affect the opportunities at the disposal of the citizenry as a result of the uneven distribution of the proceeds of growth. These mechanisms tend to entrench inequality in terms of access, opportunity, assets among others. But when growth-generating policies in Africa also focus on the channels through which the very vulnerable and deprived in society can benefit, the issue of inequality could be reduced with time.

Inclusive growth is made pronounced in Africa when sectors like Agriculture, which significantly creates employment and consequently income for the poor and the inept labor is targeted. Again, for most countries in Africa education, health and other important development programs and projects (example, effective and efficient social safety nets targeted at the poor and deprived) that will seek the welfare of the citizenry which subsequently will reduce inequality should be the topmost priority of most African governments. Thus, achieving inclusive growth should entail institutional and policy reforms that will increase economic opportunities and also enable the poor —many of whom are relegated to the informal sector— to lucratively share in and demonstrably benefit from them. McKinley (2010) posits that inclusive growth ensures people acquire access to services that can enhance their capabilities in seizing economic opportunities.

Moreover, since it is argued that high and sustainable growth centers on broad-based and market-oriented productive approaches involving the private sector, African governments should be committed to developing and maintaining an enabling environment for businesses by eliminating market distortions. By so doing opportunities are churned out by these businesses in the form of job creation, creation of market for agricultural and manufacturing products which further will increase employment in both sectors, leading to the generation of income and thereby cause a significant impact on the standard of living of the populace. By the raise in the standard of living the populace will have access to HD-maximizing commodities and hence cause an enhancement in HD.

5.3 Limitation of the Study

The study was constrained by the limited availability of data, as most of the countries had inconsistent time series data on most of the variables of interest, especially for the Gini coefficient. As a result, the sample size and the scope of the study were limited to 39 African countries (out of 54 countries) and the time for which data was most available which may possibly have adverse implications for the representativeness of the empirical results.

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APPENDIX

Section A

Non-income HD measure data

Country	HD1980	HD1985	HD1990	HD1995	HD2000	HD2005	HD2010	HD2015
Algeria	0.480689	0.526589	0.554695	0.585184	0.626745	0.667783	0.736739	0.7565
Benin	0.289928	0.33765	0.368197	0.385245	0.41135	0.463333	0.498954	0.5145
Botswana	0.463428	0.516489	0.546275	0.517972	0.50455	0.507667	0.6255	0.6805
Burkina Faso						0.347628	0.402406	0.4375
Burundi	0.258617	0.28865	0.286578	0.3039	0.315814	0.362183	0.468044	0.502
Cameroon	0.379872	0.406184	0.426711	0.422972	0.421261	0.456156	0.511617	0.533
Central African Republic	0.310767	0.313817	0.297889	0.289028	0.309669	0.343511	0.379961	0.419
Chad					0.301204	0.322037	0.358204	0.3945
Congo	0.501534	0.511345	0.489122	0.472256	0.457467	0.504012	0.572494	0.604
Congo (DR)	0.325206	0.33365	0.337601	0.333934	0.359602	0.375537	0.465056	0.5435
Cote d'Ivoire	0.345072	0.360656	0.357945	0.342972	0.352459	0.392278	0.434681	0.4635
Egypt	0.446722	0.509317	0.542272	0.585884	0.619995	0.646611	0.671222	0.692
Ethiopia					0.346325	0.418269	0.471659	0.5035
Gambia	0.298001	0.326567	0.347084	0.368934	0.404349	0.441613	0.475306	0.495
Ghana	0.417667	0.450417	0.542122	0.48985	0.504761	0.537783	0.581844	0.6015
Guinea						0.391389	0.434056	0.465
Guinea-Bissau						0.411111	0.445167	0.4755
Kenya	0.47405	0.487911	0.488792	0.468158	0.469584	0.519889	0.567278	0.593
Lesotho	0.447319	0.48428	0.515042	0.462625	0.407239	0.433753	0.489227	0.5105
Liberia	0.292674	0.317842	0.34521	0.406545	0.420989	0.467689	0.489122	0.53
Madagascar					0.50712	0.536157	0.561287	0.5645
Malawi	0.290884	0.304072	0.323995	0.4003	0.400306	0.432283	0.470056	0.517
Mali	0.205467	0.23017	0.252462	0.274738	0.321817	0.371156	0.428035	0.45
Mauritania	0.357511	0.376278	0.388811	0.425028	0.447556	0.468367	0.492195	0.52
Mauritius	0.570756	0.588189	0.627884	0.646793	0.687553	0.725127	0.752904	0.7825
Morocco	0.407128	0.453278	0.480995	0.5126	0.547267	0.585939	0.632983	0.669
Mozambique	0.255267	0.248161	0.254089	0.276889	0.323735	0.379913	0.447907	0.472
Namibia	0.5243	0.548284	0.564367	0.558778	0.510761	0.565533	0.591094	0.6255
Niger	0.189906	0.209384	0.237906	0.27131	0.30829	0.348261	0.386022	0.4245
Nigeria						0.439667	0.45843	0.504
Rwanda	0.312072	0.472606	0.131917	0.303471	0.371006	0.468328	0.516694	0.5675
Senegal	0.330267	0.379628	0.402131	0.409131	0.432639	0.481239	0.522822	0.5365
South Africa	0.529465	0.549392	0.591424	0.620838	0.58012	0.577662	0.634757	0.6825
Swaziland	0.453772	0.493745	0.513688	0.476013	0.427517	0.45755	0.531922	0.5715

Tanzania	0.380806	0.374545	0.364956	0.368667	0.40496	0.466025	0.490135	0.542
Togo	0.4163	0.411867	0.430589	0.436895	0.463956	0.489939	0.537767	0.5515
Tunisia	0.489445	0.543567	0.588511	0.632861	0.675611	0.7095	0.730839	0.747
Uganda	0.313289	0.337634	0.328867	0.336272	0.447961	0.495187	0.534822	0.559
Zambia	0.391417	0.381356	0.357739	0.389549	0.427759	0.506903	0.581096	0.61

**** Source: Author's computation

Note: The data above is the computed non-income HD measure for 39 African countries for every five-year period starting from 1980. This measure is obtained arithmetically using only education and life expectancy. Countries like Burkina Faso, Chad, Ethiopia, Guinea, Guinea Bissau, Madagascar, and Nigeria happen to have missing values for some years due to unavailability of data to compute the non-income measure.