INSTITUTIONS, AND THE TRANSLATION OF ECONOMIC GROWTH AND PRODUCTIVE ENTREPRENEURSHIP INTO POVERTY REDUCTION: GLOBAL EMPIRICAL EVIDENCE WITH FOCUS ON AFRICA

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Abstract

This study investigates the effects of three measures of aggregate growth, sectoral compositions of growth, structural transformation, and Productive Entrepreneurship (PE) on poverty reduction. It also investigates the extent to which Institutional Quality (IQ) influences the effects of the measures of growth and its sectoral composition, structural transformation, and productive entrepreneurship on poverty reduction at global level and in Africa relative to other regions. It employs Pooled OLS and Two-Stage Least Squares estimations for the period 1990-2020. The study hypothesises that the measures of EG are poverty-reducing, and that the effects are larger in higher IQ environment (Bluhm and Szirmai, 2012; and Fosu, 2022). Findings show that the independent measures of aggregate growth, and the corresponding terms of interaction with IQ dimensions have statistically significant poverty-reducing effects at global level and across regions including Sub-Saharan Africa (SSA). Each of the sectoral compositions of growth, excluding industry growth, has statistically significant poverty-reducing effects at global level. Across regions, services value-added and labour productivity growth have statistically significant poverty-reducing effects across regions including SSA. While industry value-added and both agriculture and industry labour productivity growth have no significant poverty-reducing effects across regions including SSA, agriculture value-added growth and Structural Change have statistically significant poverty-reducing effects across regions excluding SSA. The interaction terms for the dimensions of IQ and each of services and agriculture value-added and agriculture labour productivity growth have statistically significant poverty-reducing effects at global level. Across regions including SSA, the effects of interaction terms for IQ dimensions and each of services, agriculture, and industry value-added growth and of Structural Change and services labour productivity growth are negative and statistically significant. Moreover, findings show that productive entrepreneurship and it terms of interaction with IQ dimensions have statistically significant poverty-reducing effects at global level and across regions, especially in Africa and South Asia. On the whole, the effects of growth measures on poverty reduction are larger in a high IQ environment.

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List of Acronyms and Abbreviations

2SLS	Two-Stage Least Squares
ACBF	African Capacity Building Foundation
ADB	Asian Development Bank
AfDB	African Development Bank
AUC	African Union Commission
CC	Control of Corruption
DG	Developmental Governance
EAP	East Asia and Pacific
ECA	Europe and Central Asia
ECA	United Nations Economic Commission for Africa
EG	Economic Growth
ETD	Economic Transformation Database
EU	European Union
GDCF	Gross Domestic Capital Formation
GDP	Gross Domestic Product
GE	Government Effectiveness
GEM	Global Entrepreneurship Monitor
GGDC	Groningen Growth and Development Centre
GMM	Generalised Method of Moment
HDR	Human Development Report
HJCER	High Job Creation Expectation Rate
IFC	International Finance Corporation
IG	Inclusive Growth
IMF	International Monetary Fund

IOEA	Improvement-driven Opportunity-based Entrepreneurial Activity
IQ	Institutional Quality
IV	Instrumental Variable
LAC	Latin America and Caribbean
LP	Labour Productivity
LPG	Labour Productivity Growth
MDGs	Millenium Development Goals
ME	Middle East
MENA	Middle East and North Africa
NA	North America
NBD	New Business Formation Densities/Rates
NEA	Necessity-driven Entrepreneurial Activity
OEA	Opportunity-based Entrepreneurship Activity
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PCA	Principal Component Analysis
PE	Productive Entrepreneurship
POLS	Pooled Ordinary Least Squares
PR	Poverty Reduction
PSD	Private Sector Development
PSTR	Panel Smooth Transition Regression
PSV	Political Stability and Absence of Violence
PWT	Penn World Table
RL	Rule of Law
RQ	Regulatory Quality
SA	South Asia
SC	Structural Change
SDGs	Sustainable Development Goals
SLFP	Share of Labour Force in Population
SMEs	Small and Medium Enterprises
SSA	Sub-Saharan Africa
TEA	Total Early-stage Entrepreneurial Activity
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme

UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
VA	Voice and Accountability
WDI	World Development Indicator
WGI	World Governance Indicator
FMOLS	Fully Modified Ordinary Least Squares
DOLS	Dynamic Ordinary Least Squares

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CHAPTER ONE: GENERAL INTRODUCTION

1.1 Contextual Background and Motivation of the Study

Achieving poverty reduction (PR) in all forms is a major development goal at all levels across the world, especially in developing countries. A long-standing debate in literature on the fight against poverty continues to be centered around the role of economic growth (EG). This is based on the neoclassical growth theories (Solow, 1956; Lucas, 1988; Romer, 1986, 1990; and Grossman and Helpman, 1991), which claim that EG tends to increase welfare and hence reduce poverty. While the factors of production are generally considered important for increased EG, the trickle-down theory emphasises that EG is on average the main contributor to rapid PR (Kuznets, 1995; Aghion and Bolton, 1997; Tsaurai, 2021; and Olaoye et al., 2022). Indeed, empirical evidence on growth-poverty relationship also recognises EG as an important source of rapid PR (Ravallion and Chen, 1997; Roemer and Gugerty, 1997; Dollar and Kraay, 2002; Kalwij and Verschoor, 2007; Ravallion and Chen, 2007; Christiaensen et al., 2011; and Fosu, 2015 & 2017).

Despite the overwhelming evidence on the importance of EG as the primary driver of PR, there remains inconclusive evidence as to whether EG alone is sufficient for rapid and sustained PR in developing countries (Besley and Burgess, 2003; Mulok et al., 2012; Ncube et al., 2014; Bicaba et al., 2015; Sembene, 2015; Adeleye et al., 2020; and Bergstrom, 2020). This is consistent with the current situation in African countries, especially those in Sub-Saharan Africa (SSA), experiencing a low growth elasticity of poverty, despite the impressive EG.

Rates of EG in SSA have steadily increased; for example, Mckay and Thorbecke (2015) and Thorbecke (2015) found the annual growth rate of GDP per capita for SSA to be on average (-1.2%) from 1974 to 1994, 1.6% from 1995 to 2005, and between 2.2% and 3% from 2005 to 2012. Moreover, recent evidence reveals a real output growth rate of **4.5%** for SSA from 2000 to 2018, which is only second to South Asia (with a growth rate of 6.3%) among other regions of the world (Korsu and Ndiaye, 2021). However, Beegle and Christiaensen (2019) and Foresight Africa (2020) argue that 736 million people still lived in extreme poverty (on less than $1.90 a day) in 2015, with 413 million people (up from 278 million in 1990) in SSA as against 323 million in the rest of the world. These sources further revealed that the proportion of Africans living in extreme poverty reduced from 54 percent in 1990 to 41 percent in 2015, which in proportionate terms is only a reduction of 1.3% per year. Thus, **4.5%** growth in the region for the period 2000 to 2018 per year proportionately represents quite a low translation into PR in Africa, given that on average (at global level) the elasticity of PR with respect to growth is around -2. The World Bank (2018) and Foresight Africa (2020) forecasts that if the current growth-poverty situation continues without effective anti-poverty and pro-poor policies implemented, about 87 percent of global poor will live in in particularly SSA by 2030.

The literature reviewed in this study reveals that the inconclusiveness over the limited contribution of growth to rapid PR as manifested in Africa may be due to the fact that increased income does not automatically translate into PR and improved quality of life. Rather, the translation depends on a range of factors, including high income inequality, and increased population growth rate embodied with high working-age and youth populations that are limited in capacity. Other key factors include the types of sectoral economic activities, especially those with limited capacity for production and productivity, and the limited resource capacity mobilization and misallocation of these resources (if available) to unproductive sectors. Also very important is the composition of growth in terms of private sector development initiatives such as entrepreneurship and investment in the efforts for long-run and inclusive EG process and PR. Above all, the quality of governance, policy, and institutional environments are identified as important factors independently and largely influence other factors and the participation of actors including the poor in growth process for inclusive and sustained EG and its contribution to rapid PR in developing countries. Detailed discussions of these factors in relation to the states of EG and its composition for PR and of IQ for EG and PR are presented in the next four sub-sections.

1.1.1 The Composition of Economic Growth and Its Effect on Poverty Reduction

There has generally been increased data coverage, availability, and accessibility on measures of EG, PR, and IQ in developing countries. Nevertheless, there remains major data issues emphasised in literature, especially for Africa including the irregular and poor-quality data generated using rudimentary methodological approaches. Another major problem includes the use of different modification formulas and currency purchasing power adjustments by different international data source and hosting institutions in the conversion of GDP estimates into international comparable price estimates (Devarajan 2013; Jerven 2013; Chen and Ravallion, 2010; Harttgen et al., 2013; Pinkovskiy and and Young 2012; Beegle et al, 2016).

These together have given rise to increased concerns over data quality issues leading to measurement errors and omitted variable biases, which according to literature review are some of the likely factors for the inconclusive evidence on growth-poverty relationships. Despite these factors, almost all the robust empirical studies reviewed were found to have each used one among the different measures of aggregate EG. Moreover, none of the studies could apply the same robust estimation methods to compare the effect of EG on PR across regression models for the different measures of growth and the commonly employed growth-poverty-inequality model specifications identified in literature.

While growth-poverty studies based on models of single-sector neoclassical growth theories neglect the role of sectoral compositions and sources of economic activities, there is increased evidence that the extent to which growth reduces poverty depends on these sectors and the allocation of resources across them. This agrees with the theories of structural dualism and sectoral growth, which are built on the two-sector model of EG namely, the traditional/agriculture sector and the modern/non-agriculture sector now services and industry/manufacturing (Lewis, 1954; Rostow, 1960; Fei and Ranis, 1964; and Chenery et al., 1986). The theories claim that different economic mechanisms are at work, such as variations in the size of sectoral value-added and worker availability within each of the sectors and therefore cannot be lumped together. Indeed, empirical studies, especially across developing economies, have revealed evidence of relatively high significant contribution of agriculture sector value-added growth to PR than growth originating in the non-agriculture sectors like services and industry/manufacturing (Ravallion and Datt, 1996; Diao et al., 2007 & 2010; Montalvo and Ravallion, 2010; Ferreira et al., 2010; de Janvry and Sadoulet, 2010; Christiaensen et al., 2011; and Chuhan-Pole et al., 2014). Additionally, evidence has shown the significant effects of the dimensions of sectoral labour productivity growth on PR (Datt and Ravallion, 1998; Loayza and Raddatz, 2010; Imai et al., 2017; Ogundipe et al., 2017; Hamit-Haggar and Souare, 2018; and Imai et al., 2019). However, the current study literature review reveals that in SSA, there is low agricultural labour productivity growth, and that its effect on PR is insignificant relative to services and manufacturing sectors.

Furthermore, the theories of structural dualism and sectoral growth also claimed that economic development occurs in the context of structural transformation with the support of labour migration from low-productivity traditional/agriculture sector to high-productivity modern services and manufacturing/industry sectors. Such transformation leads to increased productive jobs/employment creation (which is the key to growth in output per worker), and to increased income of workers, and hence economywide growth necessary for rapid PR. Accordingly, empirical studies have also shown evidence of significant effects of the components of labour productivity growth (within-sector productivity growth, and structural change - reallocation of labour across sectors) on sustained EG and rapid PR (Naiya, 2013; Hasan et al., 2015; Page and Shimeles, 2015; Imai et al., 2017; Gupta and Gupta, 2020; Rifa'i and Listiono, 2021; and Benfica, and Henderson, 2021). Nonetheless, the literature generally indicates the lack of rapid structural change and its limited contribution to average labour productivity growth, causing premature de-industrialization in SSA (Page and Shimeles, 2015; Page, 2015; and Shimeles, 2014). Moreover, structural transformation in SSA is dominated by vulnerable employment in the low-productivity informal services sector that has limited potential for markets, hence constrained the significant contribution of structural change to average labour productivity growth and consequently PR in SSA (McMillan and Rodrik, 2011; De Vries et al, 2015; Page and Shimeles, 2015; Diao et al., 2019; Adegboye & Ighodaro, 2020; Erumban and de Vries, 2021; & Benfica, and Henderson, 2021).

Whereas the rapid EG in Africa is concentrated in commodity exports-driven growth sectors, the extractive primary natural resources are largely undiversified due to the limited exploitation to promote economic diversification in the said sector (McMillan and Rodrik, 2011; Chuhan-Pole, P., 2014; De Vries et al, 2015; Berardi and Marzo, 2017; Fox et al, 2017; Diao et al., 2019; and Adegboye & Ighodaro, 2020). Despite the associated opportunities, these sources reveal that setting up high-value addition productivity extractive industries are highly capital-intensive and often require the types of infrastructure and human capital that are lacking in Africa. The sector as they argue has limited share of labour force and limited backward spillover linkage with other sectors in terms of supply chain or demand for locally produced goods and services and hence lack pro-poor potential in most African economies.

1.1.2 The Influence of Inequality on Economic Growth – Poverty Relationship

Huge empirical evidence supports that inequality influences the poverty-reducing effect of EG. For instance, Bergstrom (2020) argues that despite most changes in poverty observed to be explained by changes in growth, the absolute inequality elasticity of poverty is on average larger than the absolute growth elasticity of poverty, which in turn also declines steeply with the initial level of inequality. In the SSA region, there is evidence of remarkable EG over the last three decades, but the growth is observed to have a limited impact on PR compared with other regions. For example, Sembene (2015) reveals that despite impressive signs of EG over the PRSP implementation period, the increased growth has neither reduced poverty headcount nor raised the income share of the poorest in SSA relative to other regions. Also, Ncube et al. (2014 & 2015) and Bicaba et al. (2015) argued that even under plausible assumptions on consumption growth and redistribution over time, eliminating poverty by

2030 is out of reach for SSA. In fact, Bicaba et al. (2015) reveal that EG is only expected to reduce poverty from 47.9% in 2010 to about 27% in SSA in 2030, which is by far above the 3% of the Sustainable Development Goals target for ending poverty in 2030. Together, they argued that the level of extreme poverty would slightly increase in SSA by 2030 if current challenges including the high level of inequality remain unaddressed. More robust studies by Kalwij and Verschoor (2007) and Fosu (2015; & 2017) argue that despite the importance of income growth for PR, SSA lagged behind other regions for growth effect on PR due to the noticeable increase in the level of poverty and inequality. Moreover, Thorbecke (2014) and the African Capacity Building Foundation (ACBF) (2017) argued that over the rapid growth period, SSA accounts for significant proportion of most unequal countries in the world, due to endemic inequality that is limiting the benefit of growth from reaching the poor. Indeed, estimates from ACBF (2017) show that there are 16 billionaires in SSA, along with about 358 million people living in extreme poverty with seven out of every 10 people in SSA living in countries where inequality is growing at a faster rate.

1.1.3 Entrepreneurship and its Effect on Poverty

Another alarming issues that emerged from literature review on aggregate and sectoral EG accelerations, and on controversies over the respective contributions to rapid PR include the nature/types and measures of growth compositions of Private Sector Development (PSD) and the limited investment in the initiatives. Indeed, theoretical concepts from development policy perspectives (UNDP, 2005; Hassan et al., 2006; Hood, 2007; and Babajić and Nuhanović, 2021) argue that the achievement of sustained and inclusive EG and PR at all levels depend on competitive PSD. Accordingly, evidence from description of the private sector by Okey (2015) and Ruhashyankiko and Yehoue (2006) identified entrepreneurship including the creation of small and medium enterprises (SMEs) as a major component of PSD that largely contribute to improved EG and PR. This is supported by the endogenous growth theory of Romer (1986) and the theory of entrepreneurial knowledge spillover (Knight, 1921; Schumpeter, 1934; Kirzner, 1973; and Audretsch, 1995). These theories in line with Baumol (1990 & 1993) argue that knowledge is an endogenous factor of production, known as entrepreneurship capital, whose associated talents play important role in explaining long-run growth process. Of course, entrepreneurship contributes to stimulating investment in economic activities, innovative competition with new/existing firms, the formalisation of the informal sector, and increased employment/job creation and tax revenue (Wennekers and Thurik, 1999; Audretsch and Thurik, 2000; AfDB, 2011; IFC, 2011; and 2013; European Union, 2012; Kritikos, 2014; and Desai, 2017). The sources argue that through individual and a combination of these channels of importance, entrepreneurship in turn contributes to sustained EG, rapid PR, and improved standard of living.

Despite the importance of entrepreneurship for PR and improved welfare, the literature reviewed in this study reveals inconclusive empirical evidence on the effect of entrepreneurship on poverty reduction, largely due to the level of economies and the sources of data and types/measures of entrepreneurship used. Reviews showed that the effect of entrepreneurship on PR varies at different stages of a country's economic development. For instance, evidence from literature reviews revealed that the effect of entrepreneurship on PR or welfare is stronger in developed economies than less developed ones. Also, from reviews, common measures include self-employment, New Business formation Densities/rates (NBD), and overall Total Early-stage Entrepreneurial Activity (TEA), which in turn constitute innovation/creativity (including the use of new technology), Improvement-driven Opportunity-based Entrepreneurial Activity (IOEA), Necessity-driven Entrepreneurial Activity (NEA), High Job Creation Expectation Rate (HJCER), and both registered and unregistered new businesses. For instance, recent empirical studies (Aziz et al., 2020; Afawubo and Noglo, 2021; Amorós et al., 2021; Ajide and Dada, 2023, and Azamat et al., 2023) used overall TEA and NBD and find significant effect of entrepreneurship on PR. However, others used Self-employment and NBD entrepreneurships and find insignificant effects on income PR (Gebremariam et al., 2004; Beck et al., 2005; Bonito et al., 2017; Djankov et al, 2019; and Adenutsi, 2023). Moreover, Gu et al. (2021) and Benghalem and Fettane (2021) used NBD and find insignificant effects on measures of social development including human development. The review revealed that such controversies are mostly observed to be associated with the use of NBD, self-employment, and other components of TEA including NEA and non-innovation entrepreneurships, despite the overall TEA has shown to significantly reduce poverty.

According to sources, entrepreneurship deals with behavioural characteristics and activities of individuals, making it a multidimensional concept that lack a unified and appropriate measure to link its effect from individual level to aggregate development outcomes like EG and PR (Wennekers and Thurik, 1999; Audretsch et al., 2006; UNCTAD, 2004; Carree and Thurik, 2003 & 2010; and Avanzini, 2011). Emphasising the importance of EG for PR, theoretical and empirical sources have identified a set of growth-oriented entrepreneurships, which are mainly entrepreneurships that positively contribute significantly to growth (Wennekers and Thurik, 1999; Audretsch et al., 2004 & 2015; Acs and Varga, 2005; Baumol and Schilling, 2008; Adusei, 2016; Aparicio et al., 2016; Ferreira et al., 2017; Bosman et al., 2018; and Kim et al., 2022). These include New Business/firm set-up and Ownership, IOEA, innovation/creativity, and HJCER, which are measured in terms TEA (see definitions and measurement details in section 4.3.3 of this report). However, there is lack of empirical literature that uses a representative measure that mainly capture these growth-oriented entrepreneurships characterised by concepts or indicators of actual individual activity-based behaviour. Moreover, reviews showed that the measures of growth-oriented entrepreneurships are largely used individually or in variable/indicator forms that does not representatively capture the other growth-oriented aspects and hence does not satisfy the theoretical definition of entrepreneurship adopted in this study. Carree and Thurik (2003) and Van Le et al. (2022) supported this by arguing that using one or a combination of two of these measures limits the estimated effect of entrepreneurship on EG and PR, since other remaining measured types/aspects are not capture. Besides, there is no definitive clarity in literature on which of these measures of growth-oriented entrepreneurship is superior within and across countries/regions. Rather, while they all focus on increased EG, this study argues that there must be some characteristics that the measures have in common, and which has not been used in empirical studies. Hence this study constructs and uses productive entrepreneurship variable that captures the features common to the various growth-oriented entrepreneurship measures, to examine the poverty-reducing effect of entrepreneurship.

Also, studies reviewed across empirical chapters of this study hold a general view about EG and PR challenges related to population growth rate and the level of resources availability (financial, human, and infrastructure). The review reveals that most developing countries including those in SSA are affected by these factors as part of the enabling environment that encourages aggregate and sectoral productivity growth as well as entrepreneurship development and the respective contributions to PR. Indeed, there remains limited investment and access to finance for business development, infrastructure and human capital development, coupled with the lack of improved technological innovations and adoption for productivity of economic activities across sectors. This is emphasised in the entrepreneurship framework conditions by various sources, identifying limited human capital, financial, and infrastructure resources as constraints that largely affect business start-ups thereby reducing its effect on EG and hence PR (UNCTAD, 2004; Eurostat of the EU, 2012; and Global Entrepreneurship Monitor – GEM, 2016).

In SSA, sources argue that the poverty-reducing effect of EG in the region is dampened by increased growth rate of population and limited access to social infrastructure and services (Christiaensen et al., 2011; Chuhan-Pole, 2014; Filmer and Fox, 2014; and Thorbecke, 2014). Chuhan-Pole (2014) and Filmer and Fox (2014) for example emphasised that SSA had the highest total fertility rate of 5.1 total births per women in 2012 in the world and more than twice as high as that of South Asia. This has contributed to the swollen population of limited capacity youth to about half of the population below 25 years of age in the region. It has also muted improvement in livelihoods as evidenced by an average annual per capita income growth rate of 1.8 percent, relative to the average annual real output growth rate of 4.5 percent in the region. Also, three-quarters of the population concentrated in the rural areas in the region, especially in low-income countries primarily rely on the low productive agricultural and informal services sectors for their livelihoods.

1.1.4 The State of Institutions for Economic Growth and Poverty Reduction

Evidence from the current study review consistently emphasised that the contributions of EG and its sectoral and other compositions to PR are largely influenced by low quality of governance, policy, and institutional environments that limit effective economic and social activities as well as political stability. Furthermore, the review reveals that such factors are highly likely to influence increased income distribution, efficient mobilization and allocation of resources, and the effective participation of actors including the poor in development process for broad-based inclusive and sustained EG and its contribution to rapid PR. This is necessary in developing countries, including those in Africa, which are currently in situations of dismal policy, institutional, and governance environments.

For instance, sources reveal that the lack of institutional policy and governance environment to effectively facilitate economic and social activities in many African countries (AfDB, 2015; Perez de La Fuente, 2016; and Foresight Africa, 2020). The same source also reveals that there is limited participation of the poor in the processes and benefits of EG in African countries. Others further argue that the business environment in Africa is dominated by economic and political instability, inefficient tax systems, high corruption, and high legal/regulatory burdens (AfDB, 2011; Brennan & Fickett, 2011; IFC, 2013; Foresight Africa, 2020; and UNECA, 2020). This is consistent with the strategic issues on which various entrepreneurship frameworks are built (UNCTAD, 2004; Eurostat of the EU, 2012; and GEM, 2016). The frameworks emphasised that the effects of entrepreneurship on PR are limited in environment with high political and macroeconomic instability, and low quality of institutions and governance that matter for sustained EG and PR.

This means that addressing institutional policy and governance related issues can be effective pathways to enhancing EG and its compositions and the respective effects on PR. Indeed, theoretical evidence has identified institutions and good governance as important determinants of sustained increases and long-run EG (Engerman and Sokoloff, 1997, 2002; Acemoglu et al., 2001 & 2002; Acemoglu and Robinson, 2012). Several empirical studies support the importance of institutional quality (IQ) for economic and productivity growth (Knack and Keefer, 1995; Hall and Jones, 1999; Acemoglu et al., 2005; Easterly and Levine, 2003; Glaeser et al., 2004; Rodrik et al., 2004; and Nguyen et al., 2018).

In fact, strong empirical evidence emphasised institutions and good governance as important determinants of entrepreneurship as a component of EG (Amorós, 2009; Klapper et al., 2010; and Urbano et al., 2019). Other empirical evidence (Hassan et al., 2006; Tebaldi and Mohan, 2010; Perera and Lee, 2013; Doumbia, 2019; and Fagbemi et al., 2020) have also revealed evidence on the importance of IQ for PR, and others (Goel and Karri, 2020; Aziz et al., 2020; Si et al., 2020; and Gu et al., 2021) for the poverty-reducing (or human development improvement) effect of entrepreneurship. More importantly, other theoretical literature (Alence, 2004; Szirmai, 2005; & 2008; Bluhm and Szirmai, 2012; and Fosu, 2022) have claimed that high IQ influences EG (including its compositions) and the extent to which these are translated into socio-economic outcomes (reductions in income poverty and inequality).

Indeed, Zhuang et al. (2010) in line with others (Perkins et al., 2013; and Torvik, 2020) argue that a broad cluster of economic and political institutions that mutually reinforces each other matters most for promoting sustained and inclusive EG. Moreover, Acemoglu and Robinson (2012) argue that the attempts to address sustained growth and distribution related constraints in developing countries like those in Sub-Saharan Africa largely depend on strong and inclusive political and economic institutions.

Also, inclusive growth frameworks by African Development Bank (AfDB) (2012), Asian Development Bank (ADB) (2011), and Cerra (2022) emphasised that actions for transforming their strategic objectives into more inclusive and sustainable growth require strong and good governance institutional environment. The frameworks broadly aim to promote high, efficient and sustained economic growth with sufficiently productive jobs and wider and equal access to sustainable economic opportunities and basic services for improved poverty reduction and income distribution. According to these frameworks, achieving such strategic goals, the governance and institutional environment should establish the rules of the game, direct how the country is managed, and enforce political accountability for the interest of the state.

While the effectiveness of governance and institutions continue to be emphasised in literature for improved development, there is still unclear evidence on the types of institutions that matter for EG and its translation into improved development outcomes (Nallari and Griffith, 2011; Perkins et al., 2013; Curtis and Cosgrove, 2018; & Torvik, 2020).

Moreover, despite the overwhelming emphasis on institutional importance for EG and PR, **no** robust empirical study has employed in the model, the direct introduction of the interaction between EG and the measure of institutions for the moderating influence of IQ on income poverty-reducing effect of EG, particularly in SSA. Also, despite the limited contribution of impressive growth to PR in SSA, **no** rigorous empirical study has examined the extent to which IQ influences, through interaction, the translation of sectoral composition of EG and structural change into PR at global and regional levels and in SSA. Moreover, while there are differences in the effects of different measures of entrepreneurship on income and non-income poverty measures, there is lack of robust empirical studies on the moderating effect of IQ on income poverty-reducing effect of productive entrepreneurship as constructed in this study.

1.2 Research Questions, Objectives, and Contributions to Literature

Based on the gaps and other challenges in literature and with reference to both the global level and to SSA in particular, this study attempts to answer the following questions:

1. Are there any significant differences among the effects of three measures of growth (mean income growth, and PWT and WDI per capita growth) on PR at the global level and in SSA relative to other regions?
2. Are there significant effects of the measures of sectoral compositions of EG and structural transformation on PR at the global level and in SSA relative to other regions?
3. Does productive entrepreneurship have any significant effect on PR at the global level and in Africa relative to other regions?
4. Does IQ influence the poverty-reducing effects of aggregate measures of growth, sectoral compositions of growth, structural transformation, and productive entrepreneurship at the global level and in SSA relative to other regions?

Based on the above contextual background and inconclusive gaps identified in literature, and the research questions raised, this study addresses the following three broad objectives:

1. To investigate the comparative effects of three measures of aggregate growth on PR and the extent to which IQ influences the poverty-reducing effect of each of the measures of growth at the global level and in SSA relative to other regions.
2. To investigate the effects of sectoral compositions of growth and structural transformation on PR and the extent to which IQ influences the poverty-reducing effect of each of these sectoral compositions of growth and structural transformation on PR at the global level and in SSA relative to other regions.
3. To examine the effect of productive entrepreneurship on income PR and the extent to which IQ influences the poverty-reducing effect of productive entrepreneurship at global level and in Africa relative to other regions.

The study contributes to literature in the following ways:

Based on objective one

i. While other studies in the growth-poverty literature have often used one measure of EG, this study is the first to compare the effects of three different measures of aggregate EG on income PR.

ii. Although previous studies largely employed generalized method of moment (GMM) estimation, this study, using 2SLS IV estimation, demonstrates that the effect of EG on PR largely depends on the estimation methods employed. This is contrary to the only previous but less robust study by Adams (2004) who compared two measures of EG using the standard model and argues that the poverty-reducing effect of EG depends on the measure of growth with statistically significant effect of mean income growth, but insignificant effect of GDP per capita.

iii. The study also demonstrates that the poverty-reducing effect of EG depends on the quality of institutions, where such effect increases in a high IQ environment.

Based on empirical objective two

iv. There is no robust empirical evidence, especially for SSA, on the comparative moderating influence of IQ on the poverty-reducing effects of sectoral compositions of EG and structural transformation. This study demonstrates that the effects of value-added and labour productivity sectoral growth as well as structural change on PR depend on the weighted average of IQ, and all its dimensions apart from political stability and absence of violence. The effects are large in high IQ environment, both at the global level and across regions including SSA.

v. The study provides a better understanding of the literature on the dynamics of growth-poverty relationship through structuralist theory, where investments are directed to sectors for improved development outcomes that benefit the poor, as opposed to the neoclassical theories with less attention to the structure and sectors of the economy.

Based on objective three

vi. The study is the first to construct and use productive entrepreneurship as a measure of entrepreneurship that shares common features of theoretically identified growth-oriented entrepreneurship while accounting for the behavioural multidimensionality concepts as well as formal and informal and all forms of businesses/firms.

vii. There is inconclusive evidence on the level of income of economies as a determinant of entrepreneurship effect on development outcomes coupled with the lack of empirical evidence on comparative regional analysis of entrepreneurship-income poverty relationship. This study demonstrates that the effect of entrepreneurship on income PR does not necessarily depend on the level of income of countries/regions, but largely on the extent to which the measure of entrepreneurship account for dimensions that are theoretically growth-oriented, and its behavioural multidimensionality.

viii. While evidence in empirical literature on the moderating effect of IQ on income poverty-reducing effect of entrepreneurship is lacking, this study demonstrates that PE significantly contributes to income PR and that high IQ environment enhances the poverty-reducing effect of productive entrepreneurship.

Across empirical objectives

ix. Evidence still remains unclear on the type of institutions that precisely matter for sustained EG and its effective translation into improved development outcomes (Nallari and Griffith, 2011; Perkins et al., 2013; Curtis and Cosgrove, 2018; & Torvik, 2020). This study contributes to the literature on identifying the specific types of institutional dimensions that matter for the moderating effect of EG and its sectoral or other components on income PR.

x. Furthermore, while the measures of IQ and growth (and its sectoral and entrepreneurial compositions) are potentially endogenous and other studies that employed 2SLS estimations had often limited to the use of instruments for one endogenous variable in addressing endogeneity, this study demonstrates a better understanding of the application of multiple instrumental variables in growth-poverty empirical models with at least two endogenous variables.

1.3 Structure of the Thesis

The thesis broadly consists of five chapters including three independent empirical chapters (chapters 2, 3, & 4) and the introductory and concluding chapters. Chapter 1, the introductory chapter, presents the contextual background and motivation of the study as well as the overall study objectives and contributions to literature.

Chapter 2 is the first empirical chapter, which is built on the theoretical foundation that aggregate EG generally contributes to rapid PR, and that IQ is the major cause of sustained and long-run EG and also matters for the rate of translation of EG into PR. The chapter presents detailed literature reviews on the effects of EG and institutions on PR, and evidence on institutional importance for sustained and inclusive EG. It also discusses literature on data quality issues regarding the measures of growth, poverty, institutions and the consequences of these issues in economic model specifications and hence causal relationships. The literature review provides the basis for the development of empirical model specification framework on growth-poverty-institution nexus relationship to address research question 1 above and its corresponding aspects of question 4.

In this chapter, the study utilises the national accounts data from the Penn World Table (PWT), World Development Indicator (WDI), and the World Bank Poverty Platform (formally PovcalNet) survey mean-income as measures of EG. It also utilises, as measures of poverty, the extreme and moderate income/consumption poverty at respectively US$1.90/day and US$3.20/day poverty headcounts (2011 PPP). In addition, it adopts the individual and weighted average, from principal component analysis, of the World Bank World Governance Indicators as measures of institutions. It employs Pooled OLS and 2SLS multiple instrumental variable estimations on data for dependent and independent variables of interest mentioned above as well as control variables from various sources for the period 1990-2020. The dataset covers developing low- and middle-income countries from the seven geographical regions across the world over the study period indicated. The exceptions are countries that lack data on measures of poverty (especially poverty spells) and other key model variables of interest. The chapter independently presents its findings, and conclusion and implications from which further areas of investigation are identified and provided the basis for the other two empirical chapters.

Chapter 3 emerged from the literature review recommendations and the future research directions in Chapter 2. This chapter is built on the structural dualism and sectoral theories of economic development where the theoretical and conceptual underpinnings are that the sectoral patterns of EG contribute to PR more rapidly than aggregate EG. The chapter considers, as sectoral pattens, the broad sectoral value-added and labour productivity compositions of EG (agriculture, services, and manufacturing/industry), and structural change/transformation (movement of labour from low to high productivity sectors and the within sector productivity). The chapter presents in-depth literature reviews on the effects of sectoral value-added and labour productivity components of EG on poverty, the poverty-reducing effect of structural change, and the nexus of EG and structural transformation in Africa. Based on the literature review, the chapter presents three independent empirical model specification frameworks. The three frameworks focus on the nexus of sectoral value-added shares, labour productivity, and structural change and IQ-poverty relationships to address research question 2 and its corresponding aspects of question 4.

Chapter 3 uses the same measures of poverty and IQ utilised in Chapter 2 but utilises annual sectoral value-added growth and employment data from the Groningen Growth and Development Centre Economic Transformation Database developed by de Vries et al. (2021). It also employs the same estimation techniques used in Chapter 2, using data for 51 developing economies from six geographical regions across the world excluding North America for the period 1990-2018. Also, independent findings, as well as conclusion and implications are presented with further areas of investigation that largely gave rise to the third empirical chapter.

Recommendations from reviews and actual empirical work in Chapters 2 and 3 provided the basis for Chapter 4 as the third independent empirical chapter. Chapter 4 is built on the foundations that EG in aggregate form may be insufficient for rapid PR. However, endogenous growth and entrepreneurial knowledge spillover theories claim that entrepreneurship capital is a factor of production that plays an important role in explaining sustained EG process necessary for PR. Moreover, other theoretical concepts of development policy frameworks claim that achievement of sustained and inclusive EG and PR depends on private sector development, of which entrepreneurship is a major component. The chapter presents a detailed literature review on the effects of entrepreneurship on poverty and EG, and institutional importance for entrepreneurship and its contribution to economic development. Based on this review, a new measure of Productive Entrepreneurship (PE) is constructed, which shares common features with the theoretical concept of growth-oriented entrepreneurship, while also accounting for the multidimensionality of the concept and the aspects of all types of firm inclusion as well as both formal and informal firms. From reviews, empirical model specification framework that utilised the newly constructed PE in the causal nexus relationships of PE-poverty and PE-IQ-poverty are developed to address objective 3 in response to research question 3 and its corresponding aspect of question 4.

The chapter utilises the same measures of poverty and IQ as those in Chapters 2 and 3 sources and utilises entrepreneurship data from the Global Entrepreneurship Monitor database. The latter contains a range of variables that make up the components of the measure of PE, derived in turn from Principal Component Analysis. The same estimation techniques used in Chapters 2 and 3 are again employed in this chapter on data from low- and middle-income countries across six regions in the world excluding North America over the period 2002-2020, with the exception of countries that lack data on measures of poverty and other key model variables of interest. Finally, the chapter presents independent findings and conclusions including implications for future areas of exploration in the field.

Chapter 5, the final section of the thesis presents the overall study conclusion, policy implications, and future research directions based on findings from the independent empirical chapters.

CHAPTER TWO: INSTITUTIONS, ECONOMIC GROWTH, AND POVERTY REDUCTION: GLOBAL EMPIRICAL EVIDENCE WITH FOCUS ON SUB-SAHARAN AFRICA

Abstract

This study investigates the comparative effects of three measures of aggregate growth on PR and the extent to which IQ enhances the poverty-reducing effect of each of the three measures of growth at the global level and in Sub-Saharan Africa (SSA) relative to other regions. It uses growth data from the Penn World Table (PWT), World Development Indicator (WDI), and PovcalNet or Poverty Platform databases; and employs Pooled OLS and 2SLS estimations for the period 1990-2020. Findings reveal that each of the three measures of growth has a statistically significant effect on PR in the global sample. However, the mean income growth has the largest growth elasticity of poverty (3.8) compared to that for PWT per capita growth (3.3) and WDI GDP per capita growth (2.9) in the global sample. Also, each of the measures of growth has a statistically significant effect on PR across regions including SSA. Moreover, the effect of the terms of interaction between IQ and each of the measures of growth has a statistically significant effect on PR in the global sample and across regions including SSA. Results show that IQ in all its dimensions significantly influences the poverty-reducing effect of the three measures of aggregate growth, and the effect is larger in a high IQ environment. In fact, in SSA, evidence shows that each of PWT and WDI GDP per capita growth has a slightly larger effect size on extreme PR than the mean income growth in high IQ environment. Hence the poverty-reducing effect of growth depends on the quality of institutional environment and not necessarily the measure of growth.

2.1 Introduction and Background of the Study

Achieving poverty reduction (PR) in all forms is a major development goal at all levels across the world, especially in developing countries. A long-standing debate in literature on the fight against poverty is the actual role played by economic growth (EG) or simply growth. Evidence consistent with the trickle-down theory of growth shows that on average EG is the main contributor to rapid PR (Kuznets, 1995; Aghion & Bolton, 1997; Young, 2019; Tsaurai, 2021; and Olaoye et al., 2022). Further supporting evidence can be found in other empirical studies (Ravallion and Chen, 1997; Roemer and Gugerty, 1997; Warr, 2000; and Dollar and Kraay, 2002).

With the increased importance of income inequality in growth-poverty relationship, two common models, the Standard and Bourguignon models, emerged and are consistently being employed in growth-poverty empirical studies. A growing set of growth-poverty standard model literature argues that while growth is uncorrelated with changes in inequality in the case where inequality is allowed to vary across countries and regions, the rate of PR largely depends on growth and changes in income inequality (Ravallion, 1995; Adams, 2004; Mulok et al., 2012; Sembene, 2015; Adeleye et al., 2020; and Mansi et al., 2020). On the other hand, empirical studies based on the Bourguignon model are built on the lognormal income distribution theory. These studies argue that in the Bourguignon model, the responsiveness of poverty to changes in measures of growth and inequality depends on the initial inequality as well as the initial density of income near the poverty line (Kalwij & Verschoor, 2007; Fosu, 2009; 2015, 2017, & 2018; and Bergstrom, 2020).

Despite the overwhelming evidence on the importance of growth as the primary driver for PR, there still remains inconclusive evidence, as they argue that growth alone is insufficient for rapid and sustained PR in developing countries. Literature reviews reveal that the inconclusiveness is due to the fact that increased income does not automatically translate into PR and improved quality of life but rather depends on factors that affect growth acceleration and its poverty-reducing effect across countries and regions. Such factors include the measures/types of growth, model specifications and estimation methods employed, changes in income inequality, macroeconomic policies and institutional environments, misallocation of limited resources (finance, human, material) across sectors, and the limited participation of the poor in the growth process.

The current study has reviewed the literature and identified different measures of economic growth that are generated differently, and hence giving rise to increased concerns over data quality as a likely factor for the inconclusive evidence on growth-poverty relationships. Despite the different measures of growth, studies reviewed in this study did not robustly compare growth-poverty relationships across different measures of growth, even though Adams (2004) attempted. Even though the Standard and Bourguignon model specifications continue to be commonly employed in literature, none of the studies reviewed could use the same robust estimation methods to compare analysis of the effect of growth on PR across the different measures of growth. Indeed, Adams (2004), the only standard model study, attempted a comparative analysis of the effect of two measures of growth on PR. However, while utilised two measures of growth, the study did not account for endogeneity nor consider regional analysis or capturing IQ and its interaction terms in its model specification.

Furthermore, most of the studies, especially the Bourguignon model-related studies, used mean income growth from household surveys. Also, with the exception of a few including Doumbia (2019), most did not capture the term(s) of interaction between IQ and growth through direct introduction in their econometric model specifications. These studies employed the fixed effects and/or Generalized Methods of Moment (GMM) estimation methods.

However, some recent studies have questioned the efficiency of the ways in which GMM is employed, by raising the potential problem of weak instruments that are only weakly correlated with the endogenous regressors and thus in most cases make GMM estimators perform poorly in growth regressions (Bazzi and Clemens, 2013; Kraay, 2015; and Fosu, 2018). In a detailed discussions provided in **section 2.2.5** of this thesis; they employed the Monte Carlo Simulation, Weak-Instrument Robust Inference diagnostics, and weak instrument-consistent inferences, and then argue that controlling endogeneity with GMM does not necessarily translate into superior predictive ability. Rather, GMM instrumental variable growth regressions studies should be based on sufficiently more generalized theoretical models, employing new methods for estimating sensitivity to violations of exclusion restrictions, supportive evidence of instrument strength from complementary methods, and employing weak-instrument robust testing procedures and estimators.

Regarding issues related to inequality and other factors, a recent study by Bergstrom (2020) finds, on average, that the absolute inequality elasticity of poverty to be larger than the absolute growth elasticity of poverty. Also, Mulok et al. (2012) argue that growth explains poverty to a lesser extent than expected at country level, since a 1% increase in growth contributed to 0.3122% of PR. Other studies have also identified Sub-Saharan Africa (SSA) as a region with remarkable growth in the last three decades but limited impact of EG on PR compared with other regions. Indeed, Sembene (2015) finds that while there are strong signs of increased growth in SSA during PRSP implementation, the increased growth has neither reduced poverty headcount nor raised the income share of the poorest in SSA relative to other regions. Also, Ncube et al. (2014 & 2015) and Bicaba et al. (2015) argued that even under plausible assumptions on consumption growth and redistribution over time, eliminating poverty by 2030 is out of reach for SSA, and that the level of extreme poverty would slightly increase in the region if unaddressed. Moreover, Kalwij & Verschoor (2007) as well as Fosu (2015 & 2017) argue that while income growth remains important for PR, SSA lagged behind other regions for growth effect on PR due to the noticeable increase in the level of poverty and inequality.

Statistically, trends in growth rate are shown to have steadily increased across countries in SSA. According to Mckay & Thorbecke (2015) and Thorbecke (2015), the annual growth rate of GDP per capita for SSA was found to be on averaged (-1.2%) from 1974 to 1994, 1.6% from 1995 to 2005, and 2.2 – 3% from 2005 to 2012. Moreover, recent evidence reveals a growth rate of **4.5%** in SSA over the period 2000 to 2018, which is found to be ahead of all other regions across the world except South Asia with growth rate of 6.3% over the same period (Korsu and Ndiaye, 2021). However, Beegle and Christiaensen (2019) and Foresight Africa (2020) argue that 736 million people still lived in extreme poverty (on less than $1.90 a day) in 2015, with 413 million people (up from 278 million in 1990) in SSA as against 323 million to the rest of the world. These sources further revealed that the proportion of Africans living in extreme poverty reduced from 54 percent in 1990 to 41percent in 2015. In proportional terms, such a reduction still represents only a reduction of 1.3% per year. Thus, if growth in the region was around **4.5%** for the period 2000 to 2018 per year (Korsu and Ndiaye, 2021), it implies quite a low translation of growth into PR in Africa, given that on average (for the world as a whole) the elasticity of PR with respect to growth is around -2. With the current growth-poverty situation coupled with the rise in population and income inequality growth rates, the World Bank (2018) and Foresight Africa (2020) forecasts that without effective anti-poverty and pro-poor policies implemented in Africa/SSA, about 87 percent of global poor will live in the region by 2030.

As pathways to effective rapid PR, studies reviewed called for future research to explore economic factors and policy instruments that promote reduction in inequality and increased economic growth and participation of the poor in growth process. They thus emphasised the need for institutional quality improvement for the achievement of mutually reinforcing objectives of increasing income and its distribution, and effective and efficient resource mobilization and allocation to productive sectors in developing countries. Indeed, sources (AfDB, 2015; Pérez de la Fuente, 2016; African Economic Outlook, 2019; and Foresight Africa, 2020) argue that these are likely to address the factors rendering growth unsustainable and less effective for PR in Africa. They identified the lack of effective policies and institutional/governance environment to support economic and social activities as well as political stability, limited participation of the poor in growth processes, misallocation of resources, and increased working-age population with limited capacity as key factors in the region.

Consistently, theoretical literature (Alence, 2004; Szirmai, 2005; & 2008; Acemoglu and Robinson, 2012; Bluhm and Szirmai, 2012; and Fosu, 2022) have claimed that high institutional quality influences growth and the extent to which it is translated into socio-economic outcomes (reductions in income poverty and inequality). However, no robust empirical study has employed in the model, the direct introduction of the interaction between EG and the measure of institutional quality for the moderating influence of institution on income poverty-reducing effect of growth and particularly in SSA.

Doumbia (2019) attempted assessing the influence of governance institutions on making growth more pro-poor and inclusive and found a nonlinear relationship between governance and pro-poor growth through which good governance support income growth and PR. However, the study employed panel smooth transition regression (PSTR) estimation in analysing the nonlinear relationship, which does not address endogeneity nor allowing the direct introduction of the interaction term between governance and growth in the model. Besides, the study did not consider any comparative regional analysis, and hence did not provide specific evidence of such nonlinear relationships in any of the regions across the world. Moreover, none of the Bourguignon model related studies reviewed could capture interaction terms for the moderating effect of IQ on the poverty-reducing effect of growth in their model specifications.

This study mainly adopts the standard model and employs the direct introduction in the model, the term of interaction between growth and IQ to investigate the comparative effects of different measures of growth on income PR and the moderating influence of IQ on the income poverty-reducing effect of EG at global level and in SSA relative to other regions. It employs pooled OLS and Two-Stage Least-Squares (2SLS) multiple instrumental variable estimations on data from various sources over the period 1990-2020. It uses the World Governance Indicators as measures of institutional quality, and per capita GDP growth from the World Development Indicator (WDI) and Penn World Table (PWT), and survey mean-income growth from the World Bank Poverty Platform or PovcalNet as the different measures of growth.

This study contributes to literature in different ways. Firstly, while other studies in the growth-poverty literature have normally used one measure of growth, this study is the first to compare the effects of three different measures of growth, each, on PR at global and regional levels. Secondly, while recent studies have mostly employed GMM estimation, this study applies 2SLS multiple instrumental variable estimation and demonstrates that the effects of growth on PR largely depend on the estimation methods employed. This is contrary to the only previous study by Adams (2004) who employed two measures of growth using the standard model and argues that the effect of growth on poverty reduction depends on the measure of growth with statistically significant effect of mean income growth, but insignificant effect of the WDI per capita GDP growth on PR. Thirdly, it demonstrates that the effect of growth on PR depends on institutional quality, and this effect increases in a high IQ environment. Fourthly, previous evidence remained unclear on the precise relationships for the type of institutions that matter for sustained growth and its translation into rapid development outcomes (Nallari and Griffith, 2011; Perkins et al., 2013; Curtis and Cosgrove, 2018; & Torvik, 2020). This study thus contributes to the literature on identifying, from a cluster of governance institutional indicator, the types of institutional dimensions that matter for the moderating effect of EG on income PR. Finally, while the measures of growth and IQ are potentially endogenous and other studies that employed 2SLS estimations are often limited to the use of instruments for one endogenous variable in addressing endogeneity, this study demonstrates a better understanding of the application of multiple instrumental variables in growth-poverty empirical models with at least two endogenous variables.

Findings reveal that in the global sample regression models with non-regional dummies, the growth elasticity of poverty is negative as expected and statistically significant at the one percent level across the three measures of growth. In the global sample regression models with regional dummies, the growth elasticity of poverty is also negative and statistically significant for the different measures of growth across regions including SSA. While the level of IQ by itself tends to contribute to poverty, the effect of the terms of interaction between it and each of the measures of per capita growth on extreme poverty is negative as expected and statistically significant. Across regions including SSA, the effect of the terms of interaction between the level of IQ and each of the measures of growth on extreme poverty is negative as expected and statistically significant. In fact, results from the global sample regression models with regional dummies show that PWT and WDI per capita GDP growth have slightly larger effect size each on extreme poverty than the survey mean income growth in high IQ environment in SSA. This shows that IQ and its dimensions significantly influence the poverty-reducing effect of all types of aggregate growth with larger contributions to PR in a high IQ environment.

Going forward from this introduction, the remaining sections of this chapter respectively present the literature review and research questions, the study methodology, empirical results and discussions, and conclusion with policy implications.

2.2 Literature Review and Research Questions

2.2.1 Evidence on Growth-Poverty Nexus

Empirical literature reviewed on growth-poverty relationships for this study has generally been grouped into three strands based on the model specifications employed and are discussed along these lines. The first strand deals with the basic model, which is based on the fact that EG should improve the standards of living of the poor but does not pay much attention to changes in income inequality and its correlation with growth. The second and third strands, namely, the standard and Bourguignon models, emerged from the increased importance of changes in income inequality or income distribution and its variation across countries and regions in growth-poverty relationships. These income inequality motivated strands are the commonly employed growth-poverty model specifications in literature over the last two to three decades.

Proponents of the first strand are convinced that a growing economy eventually benefits the poor and all segments of society (Roemer and Gugerty, 1997; Ravallion and Chen, 1997; Gallup et al., 1999; Warr, 2000; Dollar and Kraay, 2002; Kraay, 2006; Dollar, et al., 2013 and 2016). The detailed discussions are presented below.

Using ordinary least squares (OLS) on 30 years interval dataset in 26 developing countries, Roemer and Gugerty (1997) used the Penn World Table per capita GDP growth and found that the increased rate of growth significantly benefits the poorest 20 and 40 percents of the population. They revealed that even with slight deterioration in income distribution in the study countries, the poor were found to have done better in countries with rapid economic growth. According to them, growth translated into a one-for-one reduction in poverty measured in terms of an increase in the growth of income of the poorest 20 and 40 percents. They also found a sound macroeconomic policy contribution to PR, mainly through the effect on economic growth.

In a follow-up study with increased sample of countries over a relatively much longer period, Gallup, Radelet, and Warner (1999) also examined the effect of economic growth (per capita GDP growth from Penn World Tables) on poverty in a growth-poverty relationship through short and long panels models. The short-run growth model (“short panel”) uses data from 69 countries over 30-year period to examine the relationship between average income growth and both the poorest 20 percent and 40 percent of the population, while the long-run growth model (“long panel”) examines a long-term growth episode for 54 countries covering the period from 1960s to 1990s. They find, using OLS regression estimation, in the short panel analysis that the "elasticity of connection" is nearly one, but their analysis clearly indicates that where the initial income share of the poor is low, the subsequent income growth of the poor is higher than average income growth. Also, using fixed-effects regression estimates for the long panel, they find that the elasticity of connecting the poor to per capita GDP growth is one, and income growth of the poor is higher in countries with an initially lower income share of the poor. Hence results from analysis of the short panel confirmed results for analysis of longer-run effects with data covering a longer term over the period of thirty years, that in general, overall income growth is highly connected to growth of income of the poor, and that income growth of the poor is higher in countries with a lower initial share for the poor.

Another study by Ravallion and Chen (1997) employed bivariate correlation analysis to assess the systematic response of poverty to mean income growth in 67 developing and transitional economies for the period 1981-94. The study finds a strong association between the rate of growth and absolute poverty reduction with the response of elasticities of poverty to changes in growth even stronger for lower poverty lines. While poverty almost always fell with an increased rate of growth and rose with contraction, they observed a small decrease in absolute poverty, although with diverse experiences across regions and countries. However, changes in inequality were uncorrelated with changes in average living standards.

Warr (2001) used a combination of time series and pooled data analysis approach in seven countries from across regions of the Asian continental series for the period 1960-1990. The study finds the national account growth rate of GDP per capita to have a significant effect on the reduction in absolute poverty and approximately the same results for all the economies included. However, the sample was too small to support strong conclusions. Kraay (2006) employed univariate regressions to survey mean income data in the 1980s and 990s to analyse the contributions of empirically decomposed potential sources of pro-poor growth on changes in poverty. Findings show that between 60 and 95% of poverty rates are due to growth in average incomes. Moreover, growth in average incomes accounts for virtually 70% and 97% of the variance respectively in the short and long runs. Rule of law and voice and accountability as control variables were positively correlated with growth and with distributional changes, revealing their correlation with shifts in relative incomes.

Using panel data and GMM methods on cross-country data for 92 countries over the period 1950-1999, Dollar & Kraay (2002) find a one-to-one relationship between mean income growth and the growth of incomes of the poor. Moreover, the policies and institutions that promote growth also benefited the poor as much as anyone else. The effect of pro-growth macroeconomic policies on increased average incomes shows little systematic effect on income distribution. Dollar et al. (2013; and 2016) respectively used sample data in 118 and 151 countries for the period 1967–2011 and employed panel data and quantile regression techniques. They found that growth is the main driver for poverty alleviation and income growth among the poor across income distribution groups, with no trend towards greater inequality.

In the second strand, the proponents argue that while growth is uncorrelated with changes in inequality, the effect of growth on poverty depends on changes in income growth with constant income distribution, and on changes in income inequality or distribution with constant income growth (Ravallion, 1995; Besley & Burgess, 2003; Adams, 2004; Mulok et al., 2012; Sembene, 2015; Mansi et al., 2020; and Adeleye et al., 2020). Review of related empirical studies are presented below.

Examining PR in response to differences in the rate of economic growth in developing countries, Ravallion (1995) used instrumental variables (IV) estimator on survey mean income data from 36 developing countries in the 1980s. He finds a strong negative association between the levels of poverty incidence and mean income or average living standards across developing countries. For rates of PR over time, the study reveals that a 3% rate of growth measure can be expected to result in a 6-10% rate of reduction in the proportion living on less than $1 per day.

Analytically discussing the relationship between PR and both growth and income distribution, Besley & Burgess (2003) used fixed effect estimation on cross-country poverty and World Development Indicator national income data for 60 countries over the period 1990 to 2015, to ascertain the antipoverty effectiveness of growth in halving the poverty rate between 1990 and 2015. Findings show that growth reduces poverty in all regions. Despite the differences in results among regions, and the small sample sizes, these effects were found to be significant at the 5% level or below across regions except eastern Europe and Middle East and north Africa. While the study supports the view that higher EG is necessary to translate into PR, the amount of growth needed to reduce poverty rate to half in much part of the developing world is large relative to their historical growth averages. SSA appeared to be an outlier with the lowest impact of growth on poverty as well as lowest historical average growth rate. Based on study findings, the growth rate required to reduce the poverty rate of SSA to halve between 1990 and 2015 was found to be 28 times the region's historical average growth rate.

Estimating the growth elasticity of poverty and the extent of poverty decline in response to EG, Adams (2004) employed correlation and bivariate methods to analyse the WDI national account and survey mean income data of 126 intervals from 60 developing countries for the period 1980-1998. The study finds that growth contribute to PR, mainly the overall increase in incomes of all including the poor in developing countries. The study also argued that the rate of PR depends on the measure of growth. Indeed, the study found that the mean income growth elasticity of poverty is negative and statistically significant (-2.79), while the WDI growth elasticity of poverty is negative but insignificant. Furthermore, the results show that different measures of growth have no statistical effect on changes in income distribution; hence EG entirely contributes to the overall increase in incomes of all in a society including the poor. In a comparative cross-country study for countries within the European Union (EU) and the post-communist Western Balkan, Mansi et al. (2020) applied fixed effect and panel generalized least square methods on data including WDI GDP per capita data over the period 2009 to 2018. It was found that while income inequality limited the impact of further progress on PR in both economic zones, economic growth had a more significant impact on PR in EU than in Western Balkan. The result showed that while other factors significantly impacted the rate of PR in both economic zones, the most significant impact was through growth.

A country study by Mulok et al. (2012) employed Error Correction Autoregressive Distributed Lag model estimations on time series real GDP growth and poverty rate data from the Department of Statistics of Malaysia and the Central Bank of Malaysia. They found that over the period 1970 to 2009 in Malaysia, a one percent increase in growth only contributed to 0.3122% reduction in poverty. This indeed shows that growth can explain the evolution of poverty to a lesser extent than expected. Another recent country study by Rahman et al. (2021) employed descriptive and panel data regression technique on secondary data from Statistics Indonesia of North Sumatera Province for the period 2017-2019. The study determines and analyses the effects of real GDP per capita and other economic variables on the poverty rate in 33 cities and regencies of North Sumatra Province in Indonesia. Findings show that real GDP per capita and the average length of schooling had negative and significant effects on the rate of poverty, with real GDP per capita having the most dominant influence on the level of PR.

Taking a specific look at evidence for SSA in this strand, a recent study by Sembene (2015) used IVs method on survey/house mean income and poverty dataset that covers 59 fully adopted Poverty Reduction Strategy Papers (PRSP) countries around the world with 35 of which from SSA. The study determined whether countries in SSA are successful in reducing poverty incidence and securing a higher income share for the poorest quintiles during PRSP times. Findings show that while there are strong signs of remarkable growth in SSA in the last two or more decades, there is robust evidence that growth has more than proportionately benefited the top quintile during PRSP implementation. Compared to other regions, the PRSP implementation has neither reduced poverty headcount nor raised the income share of the poorest quintile in SSA. There is evidence of higher inequality that appeared to have offset the positive impact of growth on poverty in SSA.

Another largely focused study on SSA by Adeleye et al. (2020) employed pooled OLS, fixed effects, and system GMM to comparatively analyse the transformation of WDI GDP growth into PR in 58 SSA and Latin American and Caribbean countries using data for the period 2000-2015. They find that while growth demonstrates evidence of its effect on PR, the growth rate of inequality intensifies poverty and mitigates the impact of growth on PR. Also, the growth-poverty-inequality trilemma differs across income groups and regional samples. Furthermore, the interaction of income inequality with growth dampens the poverty-reducing effect of growth and supports the argument that inequality lessens the effect of inclusiveness and exaggerates poverty irrespective of the positive impact of growth.

The third strand is built on the lognormal income distribution of the Bourguignon (2003) model, which argues that the responsiveness of poverty to changes in measures of growth and inequality depends on the initial level of income inequality and the location of the poverty line or level of development, measured as the ratio of poverty line to average income. This is consistent with Aghion and Bolton (1997) on the inefficient distribution related explanations of the trickle-down mechanism, arguing that PR is affected by both the rate of growth and the state of inequality in the growth-poverty-inequality nexus. The empirical views from proponents (Kalwij and Verschoor, 2007; Lombardo, 2010; Ncube et al., 2014 and 2015; Bicaba et al., 2015; Fosu, 2015, 2017, and 2018; and Bergstrom, 2020) on this strand are discussed below.

In examining the role of income distribution in growth-poverty relationships and to determine the responsiveness of poverty to the growth rate of income and changes in income inequality, Kalwij and Verschoor (2007) used panel country fixed effects and GMM to analyse data from 58 developing countries for the period 1980-1998. They found a large cross-regional variation with respect to the effect of mean income growth on PR. This, according to them is largely explained by differences in the initial distribution of income.

Their result indicates that the responsiveness of poverty to changes in mean income and inequality significantly decreases with initial Gini and the ratio of poverty line to mean income. Despite the regional differences, income growth rates were found to account for most of the variation in PR overtime and across regions. Interestingly, it was found that while other regions experienced some form of PR, SSA was among the remaining regions with noticeable fall in mean income and increase in both poverty and inequality.

At country level, Lombardo (2010) employed OLS and GMM with data from the Survey Household Income and Wealth of the Bank of Italy to estimate the responsiveness of poverty to changes in mean income (economic growth) and income inequality in Italy across its 20 regions for the period 1977-2004. Under the assumption of lognormal distribution of income, both economic growth and inequality were found to strongly determine and characterize the patterns of poverty. Specifically, the study found that a one percent increase in mean income reduces poverty headcount index by around 2.8%, while a one percent increase in inequality increases the same poverty measure by around 2.2%.

Two studies by Fosu (2015 and 2017) used the same data set from 123 countries for the period 1977-2007 and employed random and fixed effects as well as GMM to estimate the transformation of changes in mean income growth and income inequality to PR in developing countries with focus on SSA. He finds in both studies that income growth is the major driving force behind both the declines and increases in poverty, and that while inequality appeared to have direct relationship with poverty in many countries, it limits income distribution and growth-reducing effect of poverty. Although progress has been mixed with income growth in the lead for PR, African countries, especially SSA, comparatively lagged back the countries of other regions in a global sample of countries. In his follow-up study, Fosu (2018) used the same estimation methods as above but with data set involving 39 to 41 African countries for the period 1985-2013, similar results as above were found. However, the SYS-GMM performs substantially worse than FE and RE in this study, where in no case the SYS-GMM prediction could be found to display the minimum predictive error among the various estimation models. He argues that such a finding is methodologically important, as it suggests that controlling for endogeneity with SYSGMM does not necessarily translate into superior predictive ability, but that the FE and RE methods are preferable for prediction purposes.

In a most recent study, Bergstrom (2020) used the World Bank PovcalNet data from 135 countries for the period 1974–2018 to approximate the identity that links mean income growth and changes in relative income distribution to absolute poverty, and then employed

OLS to examine the role of income distribution in PR. He finds mean income to be log-normally distributed and so allows approximation of the identity linking mean income growth and changes in relative income distribution to poverty. His study also finds that despite most of the observed changes in poverty being explained by changes in mean incomes, the absolute inequality elasticity of poverty is on average larger than the growth elasticity of poverty. Likewise, the study reveals that the absolute growth elasticity declines steeply with the initial level of economies inequality.

Using simulation techniques, Ncube et al. (2014 and 2015) explored whether Sub-Saharan Africa can eliminate extreme poverty by 2030 and how Africa's PR outcomes can be improved. The study finds that under plausible assumptions on consumption growth and redistribution, eliminating poverty by 2030 is out of reach for SSA. Even under 'best case scenario' of accelerated growth and redistribution from the top richest to the poorest 40% segment of the population, the study reveals that poverty rate would still be around 10% in 2030. Similar results were obtained by Bicaba et al. (2015), who summarized several studies and adopted the same quantitative methods to examine the feasibility of eradicating poverty globally and for SSA. By assuming the baseline scenario consumption distribution to be constant over time and an average real consumption growth of 6.5% per year up to 2030, they found that the poverty rate in SSA would fall from 47.9% in 2010 to 27% of the population in 2030, which is way above the 3% of the SDG target for ending poverty. Furthermore, the evidence shows that the number of people living in extreme poverty would even slightly increase in SSA.

2.2.2 Empirical Evidence on the Effect of Institutions on Poverty

Empirical evidence on causal relationships between institutions and poverty is influenced by key theoretical literature (Sen, 1981; Olson, 1996; and North,1993). These sources argue that economic inefficiencies and misallocation of resources due to the lack of sound economic policies and institutional arrangements prevent the benefit of growth from reaching the poor and hence traps them in high poverty incidence. Indeed, growing evidence now focuses on examining the direct causal links between diverse forms of institutional quality (IQ) and other development outcomes, especially poverty (Chong and Caldero´n, 2000b; Gaiha and Katsushi, 2005; Hasan et al., 2006; Tebaldi and Mohan, 2010; Perera & Lee, 2013; Asongu and Kodila-Tedika, 2014; Majeed, 2017; and Fagbemi et al., 2020).

In examining the causal relationship between IQ and poverty, several studies have found negative and statistically significant effects of IQ on poverty. Using both OLS and 2SLS IV estimate for a sample of 49 counties for the period 1960-1990, Chong and Calde´ron (2000) investigated the effect of different measures of institutions on the degree, severity, and incidence of poverty. The study found that the higher and more efficient the IQ, the better it contributes to reducing the degree, severity, and incidence of poverty. In addition to the overall IQ index, better quality of bureaucracy, lower risk of expropriation proved important for improved welfare of the poor.

Reviewing progress in attaining the Millennium Development Goals (MDGs) of PR, Gaiha and Katsushi (2005) employed Three-Staged Least-Squares (3SLS) estimation to assess through simulations, the prospects of achieving the MDGs by 2015 and identify priorities in accelerating poverty reduction in Asia and the Pacific region. They found that while income lowers poverty, institutions have a significant effect on income and only contribute to PR through higher incomes. Despite income inequality having a positive effect on poverty, they found that even modest institutional improvements can significantly reduce poverty through growth. In addition to limiting to the Asia and Pacific region, the study only utilised the WDI growth data in a model specification that captured IQ independently, but without its term of interaction with the measure of growth. Besides, it employed simulation techniques with limited data observations compared with more recent and updated data sets used here in this study. In addition, it used independently as well as the sum of four out of six dimensions of the World Governance Indicators (WDI) including political stability and absence of violence, voice and accountability, control of corruption, and the rule of law. While left out regulatory quality and government effectiveness dimensions, this current study utilises all the WDI independently and in combination as weighted average IQ index derived from principal components analysis to assess the moderating influence of IQ on the poverty reducing effect growth. However, their simulation results thus demonstrate the need for growth acceleration, reduction of income inequality and institutional quality improvement to achieve PR but recommended further research that merit the attention of exploring the factors that trigger such institutional improvements as these may not be so obvious.

Hasan et al. (2006) examined the effects of private sector institutions and policy related climate and regulations on economic growth and poverty across regions. Using OLS, they found that good governance, as measured by a strong commitment to the rule of law among other things, matters for PR largely through its effect on economic growth. Also, while political freedom is not associated with either higher growth or PR, efficient and corrupt-free regulatory practices governing the delivery of private sector operations relating to starting a business directly matter for both economic growth and PR.

Tebaldi and Mohan (2010) questioned the model specification and instrument(s) used by Chong and Calde´ron (2000) and the likely biased results obtained from employing the OLS estimation by Hasan et al. (2006) for not addressing potential endogeneity. As a remedy, they (Tebaldi and Mohan, 2010) used 2SLS IV estimation for 53 countries across regions and found a negative relationship between institutions and poverty via average income rather than through income inequality. Although the quality of the regulatory system, rule of law, voice and accountability, and expropriation risk contribute to PR, political stability does not appear to impact poverty, while expropriation risk is only significant marginally at reducing poverty. While Tebaldi and Mohan (2010) used monetary measures of poverty, Asongu and Kodila-Tedika (2014) employed the same estimation techniques and dataset to re-assess their results using a non-monetary and multidimensional poverty indicator as the dependent variable. Their findings confirmed the results by Tebaldi and Mohan (2010) and thus the conclusion of their study.

Other studies have used different estimation, the GMM, in exploring the nature and direction of causal linkages that connect IQ and poverty and generally found the contribution of IQ to significant PR. Perera and Lee (2013) examined the effects of economic growth and IQ on poverty and income inequality in nine developing countries of Asia for the period 1985-2009. Findings revealed that improvements in the overall IQ index contribute to the reduction in poverty. However, mixed results were obtained regarding the effect of independent IQ on poverty. The results reveal that only improvements in government stability, and law and order reduced poverty, while the level of corruption, democratic accountability, and bureaucratic quality appear to contribute to the level of increased poverty. They also show that improvements in corruption, democratic accountability, and bureaucratic quality are associated with a worsening of the income distribution.

Some studies have built on the framework that a good financial system can be influenced by sound institutional systems for improved PR. Cepparulo et al. (2017) used both OLS and GMM to analyse for a sample of developing countries over the period 1984 to 2012. They found that financial development and sound institutional environment independently have statistically significant and positive effect on PR. Another more recent one by Majeed (2017) also used GMM estimation for cross-sectional and panel datasets to explore the nexus of fnancial development, quality of institutions, and poverty in Islamic countries. The study found that fnancial inclusion and development signifcantly alleviate poverty. However, poverty-reducing efect of fnancial development is not robust across its different measures. In contrast, the poverty-reducing efect of IQ remains robustly negative and signifcant across models, with control of corruption the most signifcant predictor of poverty in the Muslim world. Despite the independent impact of private credit not poverty-reducing, its impact in the presence of high IQ proves poverty-reducing.

For specific studies at country level, Fagbemi et al (2020) examined the nexus between the institutional quality and poverty in Nigeria for the period 1984–2017 using dynamic least squares, cointegrating, and vector error correction estimation techniques. The study finds that democratic accountability and rule of law have significant effects on PR. It also reveals that the interconnection and mutually reinforcing relationship between poverty and the weak public institutional capacity has contributed to the widespread poverty in Nigeria.

2.2.3 Institutional Importance for Sustained and Inclusive Economic Development

Scholars have generally referred to institutions as the set of formal and informal rules of the game, compliance procedures, and behavioral norms designed to constrain or govern economic, social, cultural, and political interactions of human and organizational behaviour in society as a means of maximizing mobilization and distribution/utilization of resources (North, 1990; Yildirim, 2018; Roland, 2014; and Acemoglu and Robinson, 2008). These sources also argue that formal institutions, such as the rule of law, regulations, and political institutions, are captured in the form of written rules with codified statutes of enforcement subjected to verification by courts, while informal institutions are social norms of behaviour dictated by cultural or religious beliefs. For instance, Nallari and Griffith (2011) consider government as an aspect of formal institutions that put into practice rules of the game by not only how they are elected and adhered to citizens' demand, but also how public policies are effectively designed and implemented.

Theoretically, institutions have been hypothesised as a major cause of economic development and largely explain the differences in sustained increases and long-run economic growth and the variations in political and socioeconomic inequalities within and among countries/regions (Engerman and Sokoloff, 1997 & 2002; Acemoglu et al., 2001 & 2002; and Acemoglu and Robinson, 2012). Their theoretical hypotheses are built on historical geographic and demographic factors (Engerman and Sokoloff, 1997 & 2002) and the feasibility of settlement (Acemoglu et al., 2001 & 2002). These historical factors are critical in shaping institutions and political systems as the major channels linking long-run growth and socioeconomic outcomes with today's economic growth/development.

The sources claimed that Europeans settled in large numbers in colonies with low initial native (and imported slaves) population density, low settler mortality (Acemoglu et al., 2001

& 2002) and low endowment (Engerman and Sokoloff, 1997 & 2002) and created inclusive institutions, although not necessarily inclusive of the natives. In contrast, colonies with high initial native (and enslaved) population density, and both high settler mortality and endowment, ended up in a dual political economy that inherited extractive institutions with small European elites governing the rest of others.

In colonies where the elite European settlers established inclusive institutions, they provided broad access to political opportunities, good education (through schooling financed by public tax), and economic opportunities (with markets open to relatively free entry of new and innovative profitable businesses as well as state support for markets through public service and regulations), and easy access to jobs and capital (including access to credit). In line with Acemoglu and Robinson (2012), such broad access to opportunities subsequently led to and maintained lower levels of inequality, which provided better incentives for larger segments of the population to participate in and promote economic growth. The access to higher human capital accumulation, broad-based stable financial institutions with consistent macroeconomic policies for savings and investment and low interest and inflation rates, and well-protected property rights for capital (including institutionalized small land holdings) strengthened the close alignment of social and private returns to investment. Also, the institutional structures including the rule of law or checks and balances to limit the powers of the elite political executives but also encourage some degree of political centralization that enables the state to enforce law and order effectively. This, according to the sources, allows a high level of democracy where people participate actively in decision-making processes.

In contrast, in colonies where they created and maintained extractive institutions, the system favoured extremely unequal distribution in wealth, human capital, and access to political, economic, and social opportunities. To further create conditions of unequal access to economic opportunities among the heterogeneous populations, the colonies relied on regressive consumption tax system with the elites resistive to paying tax on wealth, income, and property. In addition to few constraints on executive powers that favoured corrupt and unaccountable practices, the non-elite population had limited access to franchise, schooling, property rights for intellectual capital and land, and institutions for savings and credit as well as investment opportunities. These in turn reinforced their limited access to economic opportunities, and via literacy requirements, their limited access to secrete ballot voting rights thereby encouraging low level of democracy.

Additionally, others (Bluhm and Szirmai, 2012; and Szirmai, 2005, & 2008) also hypothesized that socio-economic outcomes such as increased household incomes, income distribution, improvement in human development, improved PR, access to economic and social opportunities, and the low level or absence of conflict are what ultimately matter in economic development. In their theoretical hypothesis/framework, they claimed that the extent to which primary factors of production are transformed into these socio-economic outcomes is largely influenced by the nature of policies and institutions (political, economic, and social), which are also the ultimate causal sources of growth.

Indeed, several empirical studies have emphasised the importance of institutional quality for economic development (Knack and Keefer, 1995; Hall and Jones, 1999; Rodrik, 1999; Acemoglu et al., 2001, 2002 & 2005; Easterly and Levine, 2003; Glaeser et al., 2004; Rodrik et al., 2004; Nawaz et al., 2014; Siyakiya, 2017; and Nguyen et al., 2018). They argue based on empirical and historical perspectives that sustained increases in long-run EG as well as cross-country differences in per capita income and prosperity among countries is largely explained by institutional quality. As also discussed in the previous section, growing empirical studies (Chong and Caldero´n, 2000b; Hasan et al., 2006; Tebaldi and Mohan, 2010; Perera and Lee, 2013; Asongu and Kodila-Tedika, 2014; Majeed, 2017; and Fagbemi et al., 2020) on the causal relationship linking IQ and poverty have generally revealed evidence of significant effect of IQ on PR either directly or through its effect on dimensions of EG.

This means that the development process to address challenges associated with growth, poverty, and inequality should be informed by the prevailing institutional and policy environments. This may include exploring the types/forms of institutions and policies that can effectively respond to addressing the challenges, including those identified in literature. However, sources reveal that the institutional policy and governance environment to effectively facilitate public and private sector economic and social activities for improved economic growth are lacking in many African countries (AfDB, 2015; Perez de La Fuente, 2016; and Foresight Africa, 2020). The same sources argue that while there is limited participation of the poor in development processes that are responsive to promoting growth, the resources (human, material, and finance) needed to create the wealth necessary to fight poverty and to improve other development outcomes also remain inadequate. Coupled with the idiosyncratic characteristics of increased EG in rising levels of population and inequality, and the greater reliance of the poor on less productive sectors, SSA requires special strategies to appropriately address its constraints (Fosu, 2012; Thorbecke, 2014; Chuhan-Pole, 2014;

Filmer and Fox, 2014). These sources in line with others (Ravallion 2001; OECD, 2008; and ACBF, 2017) argued that for growth to be sustainable in the long-run and contribute substantially to PR, it should be broad-based across sectors, and sufficiently inclusive of the labour force and the poor in the growth process and its benefits.

Indeed, other sources (ECA and AUC, 2014; ECA, 2015b; and Lopes et al., 2017) argue that developing regions like Africa require a framework of coherently wide-ranging macroeconomic policies and a system of endogenously evolved institutions. Accordingly, such a framework should facilitate a process of development that contributes meaningfully to productivity-enhancement as well as institutional and societal transformation for a broad-based inclusive economy and society.

As emphasised in new institutional economics, Zhuang et al. (2010) presents a theoretical hypothesis framework on institutions derived from the central importance of predictable contracts enforcement and protection of property rights. They argue that these institutions allow the extension of market exchange, investment, and innovation at reasonable transaction costs over wider economic spheres and geographic areas. For the framework to be effective, they expressed in line with Kasper and Streit (1998), the need for effective enforcement of rules and sanctions against violation. According to them, this is because institutions only make the actions of individuals predictable with effective sanctions that support growth when embodied in the government of a state. However, Weingast (1993) argues that a strong government that protects property and enforces contracts is also likely to be strong enough to confiscate the wealth of its citizens. The framework thus captures dimensions of accountability and transparency, checks and balances, and wide participation of various actors as part of the requirements for social order and control. From this development, a unique and broad-based framework of institutions emerged constituting accountability, rule of law, political stability, bureaucratic capability, property rights protection and contract enforcement, and control of corruption, representing a cluster of mutually reinforcing growth-enhancing formal institutions. Zhuang et al. (2010) built on such a broad-based institutional framework and developed a theoretical hypothesis, stating that 'societies that fail to effectively establish a cluster of formal political and economic institutions would be faced with high costs in market transactions and would not be able to control the state, neither support private sector initiatives or market exchanges and investments, nor economic development'.

In support of Zhuang et al.'s hypothesis, Acemoglu and Robinson (2012) argue that inclusive economic institutions need and should use the state. The state provides the main platform for political institutions with the coercive capacity to impose law and order, protect private property rights, prevent theft and fraud, and enforce contracts between private parties (Acemoglu and Robinson, 2012). In addition to solving economic transaction problems, Acemoglu and Robinson (2012) emphasised that societies also need public services and infrastructure as well as some type/form of basic regulations in order to function well. They argue that while these may be provided by markets and private citizens, the degree of coordination necessary to provide such needs on a large scale requires the state as a central authority. Hence the state as a political institution should unavoidably be intertwined with economic institutions. While inclusive institutions are the bedrock for economic prosperity of a nation, they further argue that political institutions of societies remain the key determinant of the outcome of the games governing incentives in politics. This may include how governments are chosen and what their rights should be, as pathways to achieving economic prosperity.

Many scholars (Nissanke, 2015; Mishkin, 2015; Goldin, 2016; Coppock and Mateer, 2018; McConnell et al., 2018; Bernanke et al., 2019; and Larraín, 2020) have indeed identified forms of institutions that matter most for sustained EG and efficient markets. Included are institutions for protection of property rights, political stability, the rule of law and regulation (that encourage control of corruption, accountability, and transparency), competitive and open markets, efficient taxes, and economic stability from efficient financial institutions.

Indeed, Khan (2007), building on the contribution of New Institutional Economics theory that efficient markets require elaborate governance structures, developed a theoretical framework of market-enhancing governance on the assumption that efficient markets are the most important for states to influence private investors to drive economic development in the development process. In the framework, he argues that critical governance capabilities include the state's capability to maintain stable property rights, because the unclarity of property rights can raise the transaction costs of buyers and sellers and prevent potential market transactions and investments from taking place. He added that such stable property rights reveal the credibility of government in assuring investors of low expropriation risk. The framework argues that efficient markets also require governance capabilities to ensure efficient and low-cost contracting and dispute resolution, which in turn depends on a good legal judiciary system. It emphasised that while corruption increases transaction costs as well as allowing the disruption of contracts and property rights, then efficient markets require low corruption. Furthermore, efficient markets ensure the state delivers public goods and services efficiently through accountable and transparent governance. He also emphasised that sustained productivity growth depends on better resource allocation and the creation of new technologies and learning to use existing technologies effectively and rapidly. Thus, developing countries that use efficient markets ensure maximum attraction of capital and new/advanced technologies, even in mid-to high-level technology, and hence improved growth and development. This as he posits is feasible in environments with appropriate incentives such as political stability, technological capabilities in the form of required skills and managers, and higher wages and labour productivity across sectors, would amount to an acceleration of the pace of development required for catching up with developed economies.

Additionally, in support of Zhuang et al. (2010), others (Perkins et al., 2013; and Torvik, 2020) also claim that it is a mutually reinforcing broad cluster of policies and institutions (economic, political, social, and legal) that matter most for promoting modern EG and efficient markets, and to making it sustained and inclusive for improved development outcomes. Moreover, Thorbecke (2014) in line with Acemoglu and Robinson (2012) argues that the attempts to address sustained growth and distribution related constraints in developing countries including those in Sub-Saharan Africa largely depend on strong and inclusive political and economic institutions.

Furthermore, efforts towards achieving development results, especially inclusive economic growth, have consistently emphasised the importance of strong and good governance institutions that matter for inclusive growth, and as means to address growth, poverty, and inequality challenges. For instance, the African Development Bank (AfDB) (2012) inclusive growth framework is built on the objectives of wider access to sustainable socioeconomic opportunities by all, in an institutionalized environment of fairness, equal justice, and political plurality. Also, the Asian Development Bank (ADB) (2011) framework of inclusive growth is objectively aimed at promoting high, efficient and sustained growth with sufficiently productive jobs and economic opportunity; and social inclusion to ensure equal access to economic opportunity by every member of the society. Moreover, the inclusive growth framework by Cerra (2022) is focused on promoting benefit sharing in PR, increasing income and income distribution amongst all groups, and ensuring social mobility from one generation to the next. It also promotes equal opportunity to access basic services, availability of sufficient quality jobs to ensure participation of people in economic life, and empowerment in social and political life for a strong system of governance and voice and accountability. These frameworks emphasised that actions for transforming their respective objectives into more inclusive growth require strong and good governance institutional environment that establishes the rules of the game, direct how the country is managed, and enforces political accountability for the interest of the state.

Another critical government input for IG identified by Cerra (2022) is macroeconomic stability with smooth economic fluctuations and non-disruptive recessions and crisis. Indeed, Davoodi et al. (2022) argue that macroeconomic volatility has a causal relationship with growth and inclusiveness, and that where inclusiveness is missing, will in turn serve as a source of macroeconomic volatility and hence amplify the macroeconomic effects of shocks. Their evidence shows that there is a positive relationship between macroeconomic volatility and inequality. Other views presented by Davoodi et al. (2022) on conventional wisdom revealed that prior to the 2008–2009 Global Financial Crisis, macroeconomic volatility was primarily driven by productivity shocks, as an important driver of inequality. Hence, carefully addressing the problems of productivity growth would in turn address macroeconomic volatility and inequality.

Indeed, a study by Doumbia (2019) investigates the role of EG in PR and assesses the importance of governance in making growth more pro-poor and inclusive. The study used WDI national account data for the measure of growth and employed standard model specification as well as fixed effect, GMM, and Panel Smooth Transition Regression (PSTR) estimations on a sample of 112 countries for the period 1975–2012. Findings reveal that good governance indicators support income growth and PR but that only government effectiveness and the rule of law dimensions of governance can independently enhance inclusive growth. While the impact of governance on key components of inclusive growth appears to be linear, the study identifies a nonlinear relationship between governance and pro-poor growth. However, the study did not employ the direct introduction of the terms of interaction between the measures of governance and growth in the model, which would better allow accounting for analyses of nonlinearity and the moderating influence of governance on the effect of growth on PR and on making it more inclusive. Rather, the study analysed the nonlinear relationship between governance and growth using the Panel Smooth Transition Regression, which does not allow the direct use of the interaction terms in the model specification, nor addressing endogeneity. Besides, the study did not account for any regional analysis, and hence did not provide any evidence of nonlinear or moderating relationships between governance and growth in Africa/SSA compared to global level and other regions.

While literature continues to point to the importance of effective governance and institutions for improved development, there is still unclear evidence on the types of institutions that matter for EG and its translation into improved development outcomes (Nallari and Griffith, 2011; Perkins et al., 2013; Curtis and Cosgrove, 2018; & Torvik, 2020). Governance as defined by Ivanyna and Salerno (2022) is one which includes the institutional frameworks for practices of the public sector, mechanisms and quality of oversight of key institutions like the central bank, regulation of the private sector to address market failures, and the rule of law including protection of property rights. According to the UNDP (1997), governance broadly refers to how different actors and groups in society share power and decision making. It comprises mechanisms, processes, and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations, and meditate their differences. It considers how civil society and government interrelate and how that relationship might change in ways that foster better governance.

Indeed, Resnick and Birner (2006) argue that governance indicators that capture a sound decision-making environment for investments and effective policy implementations are consistently associated with increased EG. It is based on the above evidence that this study considers a cluster of the World Governance Indicators (WGI) as the form of IQ that shares common features representative of the type of institutions that facilitate the translation of growth into PR in developing countries including those in SSA. A detailed evidence-based justification for the selection of WGI is provided in **section 2.3.4** of this thesis report.

2.2.4 Empirical Evidence on Data Issues in Developing Countries

Improvement in data coverage, availability, and accessibility for assessing changes in development outcomes such as EG, PR, IQ, and living standards in developing countries continue to be emphasised in literature (Beegle et al, 2016). Unfortunately, there remain major concerns with uncommon views, especially for Africa about the increased irregular and poor-quality data generated using different rudimentary methodological approaches due to limited capacity support to research and national statistics institutions (Devarajan 2013; Jerven 2013; Chen and Ravallion, 2010; Harttgen et al., 2013; Pinkovskiy and Sala-i-Martín 2014; and Young 2012).

Indeed, statistics obtained from international organizations databases like the World Bank on measures of EG, poverty, and institutions for developing countries often lack the required quality for rigorous empirical research and evidence-based policy and decision making (Jerven, 2013; and Kinyondo and Pelizzo, 2018). According to others (Jerven, 2013; AfDB, 2013; and Kinyondo and Pelizzo; 2018), such data lack validity and reliability and are not actual measurements of indicators in the countries concerned but rather extrapolations and rough estimates made as a result of imputation to fill in gaps for missing data. These sources also emphasised that many countries are using inadequate calculations of EG statistics and outdated base years data that do not meet the annual chain indices recommended by the Systems of National Accounts (SNA), hence making the data flawed with measurement errors.

Jerven (2013) argues that while the different modification formulas and currency purchasing power adjustments in converting GDP estimates into international comparable US Dollars price estimates, the dollar values do not agree across datasets for countries. Also, it is argued in literature that the measure of GDP of an economy in the same year is theoretically determined using the same method. However, Jerven (2013) reveals that the quoted international comparable dollar estimates are from different base years across datasets, leading to systematic errors that often result in wide variations and large fluctuations in the relative rankings of economies. For instance, Jerven presented that when Angus Madison growth dataset uses 1990, the WDI and PWT growth datasets used 1995 and 1996 respectively. Hence making one dataset to rank a country like Guinea in the category among the ten poorest economies in Africa, while other datasets rank the same country in the category of the ten richest African economies in GDP per capita terms. Jerven (2013) further argues that there seems to be different scales with unknown margin of errors that are employed each time income is measured, which result in varying inconsistency across datasets. Such inconsistency as Jerven emphasised is much larger for countries in Africa compared to those in other regions.

Jerven's (2013) argument in relation to Africa is consistent with Young (2012) who reports that in Africa, there are no benchmark studies of prices that should form the basis of an international price data comparison for twenty-four of the forty-five countries for which the PWT provides international price estimates. It is also in line with June et al. (2008) who revealed that although United Nations reports national accounts in constant price for forty-seven SSA countries from 1991 to 2004, it received data for less than half of the 1,410 observations with no underlying data for fifteen of these countries.

Other sources also agree that key data issues identified, indeed relate to irregular and poor-quality data with limitations for comparability and the associated measurement errors (Ravallion et al., 1991; Ravallion, 1995; Acemoglu et al., 2001; Tebaldi and Mohan, 2010; Roland, 2014; Beegle et al., 2016; and Sundaram and Chowdhury, 2012). For instance, the

SNA requires imputation of various components/types of production measures including those related to non-monetary ones. This is evidenced by Javen (2010 and 2013) and AfDB (2013) arguing that EG in Africa, especially SSA, is strongly and positively influenced by cross-border trade data on imports and exports, while neglecting information on other important economic activities. They emphasised that such neglected economic activities including sectoral value-added production, personal expenditure, LP in agriculture and informal economic sectors, and producer price indices are all required for preferred methods of computing GDP at constant prices.

Scholars (Timmer and de Vries, 2009; and McMillan et al., 2017) have supported that in addition to the variation in coverage of the informal sector in national accounts data across countries, the failure to account for activities dominated by informality underestimate value-added production. Haggblade et al. (2007) also argue that while labour force surveys classify workers typically by their primary sector of employment, they neglect the aspects of multiple jobs for individuals who utilises a substantial fraction of their hours in activities across two or more sectors. Hence underestimate LP in the primary sector of employment. As McMillan et al. (2017) put, where there is significant difference in human capital in terms of the number of unadjusted workers for differences in skilled and unskilled labour across sectors, the measure of productivity underestimate LP in more unskilled labour sectors and overstates LP in more skilled labour sectors.

Regarding the measures of poverty and survey mean income, Ravallion and Chen (1997) emphasised the comparability problems with cross-country data for countries at different levels of income at the same time. Consequently, they argue that while comparing changes can only avoid some of the difficulties faced in level comparisons, there is a high possibility over time for measures of change to include noise caused by errors in measurement. In addition to the doubt surrounding data quality, Beegle et al (2016) mentioned that the lack of comparability between survey rounds at country level, have also contributed to the debate about methodological choices for national poverty estimates within and across countries.

Moreover, Roland (2014) and Ravallion (1995) argue that while some countries obtain information on consumption/expenditure and others on income, the two information differ from one another since income-based measure shows higher inequality than one based on consumption/expenditure. According to them, these differences could sometimes easily bias assessment of the impact of growth on poverty. Also, regarding the type of survey information sort, it may be more difficult for people to accurately remember their consumption/expenditure rather than their income (Roland, 2014). Other problems include measurement errors due to omitted country-level fixed effects likely correlated with the income variable, or due to correlated fixed effects in the currency conversions in both the poverty index and the mean income (Ravallion, 1995; and Ravallion and Chen, 1997). As they pointed out, these errors possibly bias the estimate of the impact of income growth on poverty.

Furthermore, poverty estimates require data on price changes and basket weights of consumer items to compute inflation and consumer price index (CPI). However, Beegle et al. (2016) argue that the CPI suffers from three specific problems in Africa: prices are collected only from urban markets; the basket weights rely on outdated household surveys and sometimes only on market purchases (excluding home-produced foods); and that computational errors sometimes bias the data.

In another instance, using institutional measures in empirical work is largely limited by the inherent methodological imprecisions in the concepts and definitions, and the measurement of proxy indicators/variables used for institutions (Tebaldi and Elmslie, 2008b; and Tebaldi & Mohan, 2010; Cling et al.; 2018). The literature argues that institutional measurements are based on subjective perceptions of a wide range of expert opinions and survey-based data collected from variety of sources including the public, private, NGO, and the business community. While the proxies are not ideal measures of institutions, others emphasised the huge difference between perceptions and actual measurement (Kurtz and Schrank, 2007; Andrews, 2008; Thomas, 2010; Sundaram and Chowdhury, 2012; and Roland, 2014). According to them, perception-based subjective measures of institutions might easily be biased and contaminated by a country's economic performance resulting into measurement errors.

Another econometric problem that usually arise, which may be unconnected to measurement errors, is the presence of reverse causality between endogenous and dependent variables (Aron, 2000; Acemoglu et al., 2001; Goldsmith, 2005; Fukuyama, 2008; Roland, 2014; and Taylor and Lybbert, 2020). These emphasised the strong two-way or bi-directional correlational problem relationship between institutions and economic development. They argue that institutions shape economic development, but that economic development can enable countries to invest in stronger institutions such as better law enforcement. Accordingly, others have revealed that while IQ and EG are strongly correlated, and that growth is strongly correlated with poverty, then by implication IQ is likely to be strongly correlated with poverty (Ravallion, 1995; Ravallion and Chen, 1997; Lustig et al., 2002; Bourguignon, 2003; and Bowles, 2006).

For example, Lustig et al. (2002) in their work on establishing a two-way causality between PR and EG revealed a mutually reinforcing complementarity situation that influences EG for effective PR. On the other hand, they found that the more effort countries put into addressing constraints that keep people in poverty by actively participating in development process, the greater the potential for increased economic growth. Bowles (2006) also claims that poverty persists because of institutions, and that it reinforces the institutions that cause and reproduce poverty, leading to poverty traps. In other words, Bowles argues that poor low-income countries face endogenous challenges that make it hard to promote and coordinate 'the types of collective actions necessary to transit a population from an unequal to a more equal set of institutions.

As argued by Bourguignon (2003 and 2004), the creation of development strategies to enhance growth for poverty reduction is challenging not only because of its relationship with growth on the one hand and with inequality on the other, but also due to the difficulty that lies in the two-way interaction between poverty and both growth and inequality. Thus, while correlation is not causation, these studies revealed that the evidence of the possibility of reverse causality between poverty and both EG and institutions are always highly likely. Furthermore, Ravallion et al. (1991) argue that poverty lines tend to be positively related to mean income across countries and that the response to growth of a comparable measures of poverty relative to a fixed real poverty line would probably be underestimated.

These issues generally contribute to endogeneity, an econometric problem that usually affects the causal or predictive ability to determine the measure of systematic response of dependent variables to independent variables.

2.2.5 Summary of Literature and Research Questions/Hypothesis

Literature reviewed in this study generally reveals that there are different measures of growth data generated differently. These growth measures are subject to increased concerns over data quality, especially those associated with measurement errors, which is identified in literature as one of the key factors likely to contribute to the inconclusive evidence from growth-poverty relationships. While studies require robust empirical techniques to address these errors, a large number of the studies reviewed could not employ robust techniques to address endogeneity as a problem originating from measurement errors. Besides, even with the different measures of growth, almost all the studies reviewed have each used only one measure of growth.

The review also reveals that, following the importance of income inequality for the poverty-reducing effects of growth, two common model specifications are employed in literature, namely the Standard and Bourguignon models. However, none of the studies used the same robust estimation methods to compare analysis of the effect of growth on PR across the different measures of growth commonly used in literature. Indeed, Adams (2004), who used the standard model, is the only study that attempted a comparative analysis of the effect of each of two measures of growth on PR. However, while limited to only two growth measures, the study did not account for endogeneity, and neither considered comparative regional analysis, nor capturing the measures of IQ or its interaction terms in its model specification. The study demonstrates that the rate of PR depends on the measure of growth, with negative and statistically significant poverty elasticity of mean income growth, but negative and insignificant poverty elasticity of WDI growth.

Although some studies often ignore the tackling of endogeneity problems, others have applied econometric approaches such as the difference or system Generalized Method of Moments (GMM) dynamic panel estimators to address the issues but have met with various challenges. As emphasised by Arellano and Bond (1991), the GMM estimator takes advantage of moment conditions that exploit deeper lags beyond the first or second, zeroing out lagged values that would be treated as missing in the two-stage least squares (2SLS) dynamic panel estimators.

Generally, GMM estimators, especially the system-GMM, as described by Kraay (2015), essentially constitute a system of two linear instrumental variables regressions, one that relates growth rates to levels of explanatory variables, and the other that relates changes in growth rates to changes in explanatory variables. It relies on a large set of lagged levels and differences of explanatory variables as internal instrumental variables to isolate causal effects. Literature has emphasised that the validity of statistical inferences about the effects of explanatory variables of interest in all instrumental variable regressions depend on the strength of correlation between the instruments and the endogenous explanatory variables, or the extent to which variance in the endogenous variables is explained by the instruments. This means that weak correlation of instruments with the endogenous explanatory variables can result in acute biasness with distributions in finite samples that are very different from conventional asymptotic normal approximations. Hence, the point estimate interpretation and conclusions about significance of the conventional t-statistic can be misleading.

Furthermore, while most practical applications of GMM assumed the internal instruments to be strong, others (Hayakawa, 2009; and Bun and Windmeijer, 2010) argue that it is possible for it to also suffer from severe weak instrument biases. Moreover, Blundell, Bond, and Windmeijer (2000) demonstrate that the system-GMM estimator broadly represents a weighted average of the difference and levels equations with the weights on the levels equation moments increasing in the weakness of the difference equation instruments. In this way, they cast doubt on the ability of system-GMM to yield strong identification as used in other settings, if instrumentation of contemporaneous differences by once, or multiple lagged levels are weak, and instrumentation of contemporaneous levels by lagged differences is weak.

For robust evidence, Bazzi and Clemens (2013) and Kraay (2015) investigated instrument strength by replicating a variety of published system-GMM applications growth regression studies. Both studies employed the Monte Carlo Simulation and Weak-Instrument Robust Inference diagnostics by unbundling the system GMM estimator into its constituent "differenced" and "levels" equations and carried out and report separately for these two equations on weak instrument diagnostics and weak instrument-consistent inferences using 2SLS thereby permitting simple and transparent tests of instrument strength in a closely related setting.

Applying these techniques, both studies found consistent results showing pervasive evidence of main internal instruments to be weak in the benchmark specifications system-GMM estimator cross-country growth-inequality regressions replicated. This is contrary to the emerging consensus on empirical evidence from the replicated studies of system-GMM estimated cross-country growth regressions, that inequality has a statistically significant negative effect of inequality on growth. In fact, Bazzi and Clemens (2013) emphasised that with a weakly instrumented levels equation, system-GMM estimates can exhibit biases similar in magnitude to uncorrected OLS variants. They also found a wide range of positive and negative values from the weak instrument-consistent confidence sets for the estimated effect of inequality on growth, suggesting that it is inappropriate to draw strong conclusions (as already done for the replicated benchmark specifications studies) about either negative or positive effects of inequality on growth once the poor performance of the internal instruments used are fully accounted for.

Evidence from these two studies argue that a range of other robust empirical studies can indeed generate more evidence of non-spurious results and hence suggest the following ways that growth empirical studies can address instrumentation difficulties associated with GMM estimations: (i) basing instrumental variable growth regressions on sufficiently more generalized theoretical models, (ii) employing new methods for estimating sensitivity to violations of exclusion restrictions, (iii) opening the "black box" of GMM with supportive evidence of instrument strength from complementary methods of assessing instrument strength, and (iv) employing weak-instrument robust testing procedures and estimators.

Furthermore, Fosu (2018) in a recent study observed that for predictive purposes, system GMM performed poorly than the fixed and random effects techniques used in the same study. While results from the fixed and random effects estimates were prioritised over GMM estimate results, Fosu suggested that in controlling for endogeneity in related studies, GMM does not necessarily translate into accurate predictive ability.

From the above discussions, there is no robust empirical study on the comparative analysis of the effect of three measures of growth on PR, and account for regional variations. This study attempts to address these inconclusive literature gaps using robust estimation methods that respond to addressing endogeneity issues with the below research question:

Are there any significant differences among the effects of three measures of growth (mean income growth, and PWT and WDI per capita growth) on poverty reduction at the global level and in SSA relative to other regions?

Also, evidence from literature review clearly reveals the importance of growth for PR, but remains inconclusive on growth being the primary driver of PR. Some studies argue that while growth contributes to PR, it alone is still insufficient for rapid and sustained PR in developing countries. This is due to the effect of other factors such as changes in income inequality, the measures/types of growth, macroeconomic policy environment, and even the analytical model specifications and estimation methods employed. These factors affect growth acceleration and its poverty-reducing effect across countries and regions.

For instance, several studies have found growth as the primary driver of PR even in the midst of direct and indirect effect of non-negligible variations in inequality on the growth elasticity of poverty. However, Bergstrom (2020) recently finds that, in fact, the absolute inequality elasticity of poverty is on average larger than the absolute growth elasticity of poverty. Mulok et al. (2012) demonstrate that growth can explain the evolution of poverty to a lesser extent than expected, as they found that a 1% increase in growth can only reduce poverty by 0.3122%.

In Sub-Saharan Africa (SSA), such inconclusive evidence is glaring as available evidence has mostly identified the region as one with limited impact of growth on PR compared with other regions. For example, Sembene (2015) finds robust evidence that while there are strong signs of remarkable growth in SSA in the last two decades and more during PRSP implementation, the increased growth has benefited the rich more, and that it has neither reduced poverty headcount nor raised the income share of the poorest in SSA relative to other regions. In fact, Ncube et al. (2014 and 2015) and Bicaba et al. (2015) argued that even under plausible assumptions on consumption growth and redistribution over time, eliminating poverty by 2030 is out of reach for SSA, and if unaddressed the level of extreme poverty would slightly increase in the region. Other studies (Kalwij and Verschoor, 2007; and Fosu, 2015; and 2017) argue that while income growth remain important for PR, SSA countries lagged behind countries of other regions for growth effect on PR due to the noticeable increase in the level of poverty and inequality. They called for future research to explore economic factors and policy instruments likely to strike the balance between reduction in inequality and increase in economic growth as pathways to effective PR.

A consensus among these studies is the need for institutional quality improvement to encourage the achievement of mutually reinforcing objectives such as enhancing increased income and its distribution, and effective and efficient resource mobilization to accelerate stronger, resilient, and inclusive growth in developing countries. The reforms should enhance institutions that are likely to promote broad-based and inclusive growth and effective governance-oriented poverty interventions. Indeed, theoretical and empirical literature reviewed in this study on institutional importance emphasised good governance and high-quality and inclusive institutional environments for improved and sustained growth and its transformation into rapid PR and increased income distribution.

Despite the emphasis on institutional importance, evidence by Foresight Africa (2020) reveals the lack of institutional policy and governance environment to effectively facilitate economic and social activities in many African countries. Moreover, coupled with the idiosyncratic characteristics of increased economic growth in rising levels of population and inequality, Foresight Africa associates the insufficient effect of growth on PR with the limited participation of the poor in development processes that promote economic growth in Africa. Hence the region requires specific strategies for appropriately addressing its poverty, growth, and inequality related challenges (Fosu, 2012; Thorbecke, 2014; Chuhan-Pole, 2014; Filmer and Fox, 2014). Drawn from the perspective of effective economic development policy/intervention design and implementation, this study literature review identified the types/forms of institutions that matter for promoting sustained and inclusive growth (Zhuang et al., 2010; ADB, 2011; Acemoglu and Robinson, 2012; AfDB, 2012; Perkins et al., 2013; Torvik, 2020; and Cerra, 2022). These sources commonly recommended a mutually reinforcing broad cluster of a combination of economic and political policies/institutions (economic, political, social, and legal) as the type/form of institutions that matter most for such purposes.

Fosu (2022) and Alence (2004) in line with Torvik (2020) posit that the World Governance Indicators (WGIs) as measures of institutions are closely related to developmental governance institutions. They present a combination of broad indicators of institutional dimensions (economic, political, social, and legal) that are mutually reinforcing. WGIs are closely aligned with forms of institutions emphasised by scholars that matter most for sustained and inclusive EG (Nissanke, 2015; Goldin, 2016; Coppock and Mateer, 2018; and Larraín, 2020). Institutions like protection of property rights, political and economic stability, rule of law, regulations, accountability, control of corruption, competitive open markets, and other macroeconomic policies are indeed captured within the WGIs dimensions.

Of course, Doumbia (2019), the only study reviewed on the moderating effect of institutions on the income poverty-reducing effect of aggregate EG, attempted to assess the influence of governance institutions on making growth more pro-poor and inclusive. While the study found that good governance indicators support income growth and PR, it also identifies a nonlinear relationship between governance and pro-poor growth. The study however analysed the nonlinear relationship using panel smooth transition regression estimation, which neither allows the direct introduction of the term of interaction between governance institutions and growth in specification models, nor account for endogeneity. Besides, the study did not consider any regional analysis and hence provided no evidence on nonlinear/moderating relationships between governance and growth for SSA relative to other regions in the global sample.

This study contributes to resolving the inconclusive evidence on the importance of EG as the primary driver of PR, and to enhance sustained and inclusive EG acceleration and its income poverty-reducing effect in especially SSA. It thus employs in the model, the direct introduction of the term of interaction between EG and the cluster of WGIs institutions as a moderating factor to examine the claims in literature (Alence, 2004; Szirmai, 2005; & 2008; Bluhm and Szirmai, 2012; and Fosu, 2022) that high institutional quality influences the extent to which EG is translated into socio-economic outcomes (including reductions in income poverty and inequality). The study thus attempts to address the research question below:

Does IQ influence the poverty-reducing effects of aggregate measures of growth at the global level and in SSA relative to other regions?

Based on the research questions, this study therefore investigates the following specific objectives:

i. Examine the comparative effects of three different measures of aggregate growth on poverty reduction at global level and in SSA relative to other regions.
ii. Analyse the extent to which IQ influences the poverty-reducing effects of each of the three measures of growth at global level and in SSA relative to other regions.

2.3 Methodology

2.3.1 Introduction

This section presents the study design and empirical model for analysis of the relationship between the measures of growth, institutional quality and poverty. It describes the data and its respective sources and variables. It also describes identification strategy for addressing endogeneity, and the estimation techniques.

2.3.2 Empirical Specification

The study is built on theoretical and empirical literature on growth-poverty relationships. The traditional growth theories emphasised the role of capital accumulation, investment, natural resources, and technological progress in explaining the rate of economic growth for improved human welfare and PR (Lucas, 1988; Romer, 1986 & 1990; and Coppock and Mateer, 2018). This is consistent with the trickle-down theory of poverty (Kuznets, 1955; Young, 2019; Tsaurai, 2021; and Olaoye et al., 2022). The trickle-down theory argues that increased economic growth, which is essentially the result of high rate of capital accumulation and investment, is directly associated with rapid PR if income distribution remains constant. Indeed, Aghion & Bolton's (1997) explanations of the trickle-down theory emphasised that the increased rate of capital accumulation in the economy may influence the availability of funds to the poor for investment purposes, which in turn makes the poor richer. Moreover, they argue that under sufficiently high rates of capital accumulation, the trickle-down of wealth from the rich to the poor is expected to continue and lead to a unique steady-state distribution of wealth.

Interesting empirical studies have used the trickle-down theory to analyse the responsiveness of poverty to growth on the basis that, on average, the incomes of the poor tend to grow at the same rate as the mean income or per capita GDP growth of the rest of society (Romer and Gugerty, 1997; Gallup et al., 1999; and Dollar and Kraay, 2002). According to these sources, the fundamental econometric estimation equation for examining the relationship between the changes in poverty and average income growth is as follows:

$$\Delta InP_{it} = \lambda_t + \beta\Delta Iny_{it} + \varepsilon_{it} \qquad (1)$$

where P_{it} represent measures of poverty headcount (\$1.90 and \$3.20 a day), $\Delta InP_{it} = InP_{it} - InP_{it-1}$ (annualised log-change in poverty headcount), $\Delta Iny_{it} = Iny_{it} - Iny_{it-1}$ (annualised log-change in GDP per capita or mean income), i is the country index for the period t, ε_{it} is the error term (white noise-error process that includes errors in poverty measure and changes over time t), t-1 is the year-observation before time t, while λ_t is the country-level fixed effect, and β, the estimation parameter, is the growth elasticity of poverty.

This study builds on evidence reviewed in **Section 2.2.3** to assume that the growth elasticity of poverty (β) vary linearly with the initial institutional quality (IQ_{it-1}) environment as follows:

$$\beta = k(IQ_{it-1}) = \beta_1 + \beta_2 IQ_{it-1} \qquad (2)$$

Where k is a "transference" function, which facilitate the rate of transformation of ΔIny_{it} into ΔInP_{it}; β_1 and β_2 are estimation parameters, and IQ_{it-1} is the measure of initial institutional quality that influences the transformation process of ΔIny_{it} into ΔInP_{it}. Substituting equation (2) into (1) gives equation (3) below:

$$\Delta InP_{it} = \lambda_t + \beta_1 \Delta Iny_{it} + \beta_2(\Delta Inyit^{*}IQ_{it-1}) + \varepsilon_{it} \qquad (3)$$

The study hypothesis from equation (3) that growth and the term of interaction between it and IQ_{it-1} have negative effects on poverty. In other words, growth reduces poverty in all countries, but it reduces poverty by more in countries with higher institutional quality.

Also, other growing empirical studies generally revealed evidence of statistically significant effect of independent IQ_{it-1} on PR (Chong and Caldero´n, 2000b; Tebaldi & Mohan, 2010; Asongu and Kodila-Tedika, 2014; Cepparulo et al, 2017; Majeed, 2017; and Fagbemi et al., 2020). Thus, accounting for the independent effect of IQ_{it-1} on poverty, equation (3) becomes,

$$\Delta InP_{it} = \lambda_t + \beta_1 \Delta Iny_{it} + \beta_2(\Delta Inyit^{*}\ IQ_{it-1}) + \beta_3 IQ_{it-1} + \varepsilon_{it} \qquad (4a)$$

In the second strand, literature generally emphasised that changes in poverty over time in a country is arithmetically related to its sequential decomposition into proportional changes in per capita or average income growth with constant income distribution, and changes in the relative distribution of incomes with constant income growth (Ravallion, 1995; Besley and Burgess, 2003; Adams, 2004; Mulok et al., 2012; Sembene, 2015; and Adeleye et al., 2020). These sources argue that the average income and inequality elasticities of poverty represent the direct effects of changes in income growth and in inequality on poverty. Thus, following this set of literature that accounting for the change in income distribution or income inequality, which is simply the annualised log change in income inequality ($\Delta InG_{it} = InG_{it} - InG_{it-1}$), equation (1) becomes as follows:

$$\Delta InP_{it} = \lambda_t + \beta_1 \Delta Iny_{it} + \beta_2 \Delta InG_{it} + \varepsilon_{it} \qquad (4b)$$

Also, other growth-poverty related studies (Ravallion and Datt, 2002; Adeleye et al., 2020; and Rahman et al., 2021) suggest the need to control for initial level of human capital (in this study, initial level of education). Hence combining equations (4a) and (4b) and then accounting for initial level of human capital (H_{it-1}) in country 'i' for the time t, would result in equation (5) below:

$$\Delta InP_{it} = \lambda_t + \beta_1 \Delta Iny_{it} + \beta_2(\Delta Inyit{*}IQ_{it-1}) + \beta_3 IQ_{it-1} + \beta_4 \Delta InG_{it} + \beta_5 H_{it-1} + \varepsilon_{it} \quad (5)$$

Equation (5) is the Standard model for growth-poverty relationship that captures the terms for IQ_{it-1} and its interaction with growth.

According to the above literature that led to equations (1) and (4b), it means that a constant or no income distribution would cause the income to change for all income groups at the same rate. This is often the reason why recommended policies for PR in developing countries are often targeted entirely at promoting average income growth.

However, considering the population of a country and consequently how income is distributed among them, other studies have found that higher inequality reduces the absolute income growth elasticity of poverty (Ravallion, 1997; Harnmer and Naschold, 2000; and Ravallion, 2001). Consistent with these sources, other set of literature argue that there is a slightly different arithmetic relationship among changes in poverty, mean income growth, and income inequality (Datt and Ravallion, 1992; Epaulard, 2003; Kalwij and Verschoor, 2007; Klasen and Misselhorn, 2008; Lombardo, 2010; Fosu, 2017 & 2018; and Bergstrom, 2020). The above literature in line with Khan (2009) explained that when income distribution gets worse, it implies that income of the poor rises at a much slower rate than the average income, while income for the rich rises at a faster rate, which in combination leads to slower PR. On the other hand, with improvement in distribution, the income of the poor increases faster than the average, leading to a faster rate of PR.

While increased PR has been prominently associated with higher per capita income growth, this set of literature emphasised concerns over the impact of a change in income distribution on the population PR in growth-poverty relationships. They argue that with a log-normal income distribution, the effects of income growth and distribution on poverty depend on the initial level of income inequality (lnG_{it-1}) and the location of the poverty line or level of development proxied by the ratio of poverty line to average income (lnZ/y_{it}). According to them, the same effects also depend on the overall decomposition process of changes in poverty, which is attributed to both income growth and distribution. They built on the existence of a technically correct arithmetic identity links of non-linear indirect relationship between changes in per capita or mean income growth and poverty, and between changes in relative income distribution and poverty.

The model captures the levels of $\ln G_{it-1}$ and $\ln Z/y_{it}$ in logarithms. Thus, for linear approximations of these parameters in the poverty-growth-inequality relationship and accounting for the independent effects of $\ln G_{it-1}$ and $\ln(Z/y_{it})$ as done by others (Lombardo, 2010; Fosu, 2015; & 2017; and Bergstrom, 2020) gives:

$$\Delta \ln P_{it} = \theta_t + \{\theta_1 + \theta_2 \ln G_{it-1} + \theta_3 \ln(Z/y_{it})\}\Delta \ln y_{it} + \{\sigma_1 + \sigma_2 \ln G_{it-1} + \sigma_3 \ln(Z/y_{it})\}\Delta \ln G_{it} + \delta_1 \ln G_{it-1} + \delta_2 \ln(Z/y_{it}) + \nu_{it} \quad (6)$$

This study adopts the above Bourguignon model. Readers are referred to the literature (Bourguignon, 2003; Kalwij and Verschoor, 2007; and Lombardo, 2010) for detailed analytical derivation of the model.

Similar to equation (2) for IQ_{it-1}, a new transference function, $c(IQ_{it-1})$ is defined as follows:

$$\theta_1 = c(\mathrm{IQ}_{it-1}) = \alpha_1 + \alpha_2 \mathrm{IQ}_{it-1} \quad (7)$$

Substituting equation (7) into equation (6), where $\alpha_1 and \alpha_2$ are estimation parameters, gives

$$\Delta \ln P_{it} = \theta_t + \{\alpha_1 + \theta_2 \ln G_{it-1} + \theta_3 \ln(Z/y_{it-1})\}\Delta \ln y_{it} + \{\sigma_1 + \sigma_2 \ln G_{it-1} + \sigma_3 \ln(Z/y_{it-1})\}\Delta \ln G_{it} + \delta_1 \ln G_{it-1} + \delta_2 \ln(Z/y_{it-1}) + \alpha_2 \Delta \ln y_{it} * IQ_{it-1} + \nu_{it} \quad (8)$$

Similar to equation (5), accounting for the independent terms of IQ_{it} and initial level of human capital in equation (8) gives the modified Bourguignon model in equation (9) below, which is analogous to the modified Standard model in equation (5)

$$\Delta \ln P_{it} = \theta_t + \{\alpha_1 + \theta_2 \ln G_{it-1} + \theta_3 \ln(Z/y_{it})\}\Delta \ln y_{it} + \{\sigma_1 + \sigma_2 \ln G_{it-1} + \sigma_3 \ln(Z/y_{it})\}\Delta \ln G_{it} + \delta_1 \ln G_{it-1} + \delta_2 \ln(Z/y_{it}) + \alpha_2 \Delta \ln y_{it} * IQ_{it-1} + \delta_3 IQ_{it-1} + \delta_4 H_{it-1} + \nu_{it} \quad (9)$$

Where ν_{it} is the error term (white noise-error process that includes errors in poverty measure and trend rate of change over time t), while θ_t is a fixed effect reflecting the time-persistent differences between countries in distribution, and θ_2, θ_3, α_i, σ_i, and δ_i are estimated parameters.

Drawn from related literature (Fosu, 2015; & 2017; Bourguignon, 2003; and Kalwij & Verschoor, 2007), the expectations of the signs of the estimation parameters are presented.

In line with the study hypothesis, the coefficients of the growth rate of GDP per capita, IQ, and the interaction term of the two variables, which are respectively α_1, δ_3, and α_2 are all expected to be negative. Increases in GDP per capita and IQ are expected to reduce poverty, and that a higher level of IQ would increase the rate at which aggregate GDP per capita can be transformed into PR.

In contrast, the coefficient of the growth rate of inequality (σ_1) is theoretically expected to be positive, for a worsening income distribution results in high inequality and so expected to increase the rate of poverty. Consequently, the coefficient of the interaction term of initial inequality and the growth rate of per capita GDP (θ_2) is expected to be positive, since a higher level of initial inequality would decrease the acceleration rate of transforming growth into PR.

The sign of (θ_3) should be positive, consistent with the hypothesis, based on the lognormal income distribution, that a larger income (relative to the poverty line) would have associated with it a higher income elasticity. In contrast, (σ_2) is likely to be negative, given a diminishing poverty-increasing effect of rising inequality.

The sign of (σ_3) is also likely to be negative, as in a relatively low-income economy (high Z/y_{it}), improving income distribution (lowering inequality) might raise poverty by increasing the likelihood of more people falling into poverty. δ_1 and δ_2 are likely to be positive for rising initial inequality or an increase in the poverty line relative to income should, ceteris paribus, exacerbate poverty, in both cases. In fact, Fosu (2017) argues that these coefficients do not affect the income or inequality elasticity of poverty.

2.3.3 Data Issues and Identification Strategy

Despite the increased data coverage, availability, and accessibility on measures of EG, poverty, and IQ in developing countries (Beegle et al, 2016), there are major data issues emphasised in literature, especially for Africa. On one hand, these include the irregular and poor-quality data generated using rudimentary methodological approaches by constrained national statistics institutions. On the other hand, it includes the use of different modification formulas and currency purchasing power adjustments, by the different international data source and hosting institutions, in the conversion of GDP estimates into international comparable price estimates (Devarajan 2013; Jerven 2013; Chen and Ravallion, 2010; Harttgen et al., 2013; Pinkovskiy and and Young 2012).

The literature reviewed in this study emphasised that statistics obtained on these variables from databases like those of the World Bank often lack the required quality for rigorous development research and evidence-based policy and decision making (Jerven, 2013; and Kinyondo and Pelizzo, 2018). According to Jerven (2013) and AfDB (2013), such data are not actual measurements by the countries concerned but rather as a result of imputations or extrapolations to fill in gaps for missing data and hence rough estimates. They also emphasised that many countries are using outdated base years and inadequate calculations of the statistics, making them flawed with measurement errors.

One of the key data issues identified, especially in Sub-Saharan Africa, is the irregular generation of data, which is often of poor-quality due to measurement errors (Ravallion et al., 1991; Ravallion, 1995; and Acemoglu et al., 2001; Tebaldi and Mohan, 2010; Roland, 2014; Beegle et al., 2016; and Sundaram and Chowdhury, 2012). While emphasis endogeneity issues in econometric analysis, the presence of reverse causality between the endogenous and dependent variables, though not a data problem, is also another issue of concern that often contribute to bias empirical results (Ravallion, 1995; Ravallion and Chen, 1997; Aron, 2000; Acemoglu et al., 2001; Lustig et al., 2002; Bourguignon, 2003; Goldsmith, 2005; Bowles, 2006; Roland, 2014; Taylor and Lybbert, 2020; Cerra et al., 2022). Moreover, omitted variable bias as emphasised in econometrics is also mentioned by Roland (2014), while Ravallion and Chen (1997) emphasised the comparability problems with cross-country data for countries at different levels of income at the same time. These issues generally contribute to endogeneity, an econometric problem that usually affects the causal or predictive ability to determine the measure of systematic response of dependent variables to independent variables.

While explanatory variables of interest in this study, the measures of institutions and EG are endogenous candidates for these problems, attempts have been made to address such endogeneity issues to identify the causal effects of both measures on PR. Whereas some studies have often ignored the tackling of endogeneity problems, this study following others (Ravallion, 1995; Chong and Calderon, 2000; Tebaldi and Mohan, 2010; and Sembene, 2015) chooses to employ 2SLS instrumental variables estimation to address such potential endogeneity issues. This then permit the possibility of making inferences with the observational data used and to account for both observed and unobserved effects (Gujarati, 2015; Wooldridge, 2020; Hong, 2020; & Stock and Watson, 2020). In line with general literature, three properties are to be met for valid instruments, including being highly correlated with the endogenous variable, being uncorrelated with the error term, and should only impact the dependent variable through the endogenous variable.

With detailed reviews of the literature, key instrumental variables were identified to have been often used in literature for the measures of EG and IQ. For the measures of IQ, absolute latitude, the log of settler mortality, legal origin, and ethnic fractionalisation index were identified. In terms instruments for the measures of EG, natural logarithm of (and annualized log change in) commodity terms of trade and its components of export and import price indices, lagged values of the measures of growth, annualised changes in mean temperature and rainfall (precipitation) of economies, were identified. However, based on data availability limitations for especially Sub-Saharan African region, and results from correlation matrices as well as Durbin-Wu-Hausman endogeneity and first-stage regression instrument validity test statistics, absolute latitude was selected for IQ. Similarly, for the same reasons, natural logarithm of (and annualized log change in) commodity export and import price indices, and the lagged values of the measures of growth were selected for EG. For the terms of interaction between IQ and EG, the corresponding terms of interaction between the respective IVs for IQ and the measures of EG were employed as IVs.

Presented below are descriptions of the selected usable instrumental variables and the respective theoretical and conceptual explanations for which they are considered to meet exclusion restrictions in this study.

a. Absolute Latitude

Latitude is a measure of the distance of a colony from the equator, which according to sources (La Porta et al., 1999; Hall and Jones, 1999; and Easterly and Levine, 2003) is determined as the absolute value of latitude of a country in degrees divided by 90 to place it on a 0 to 1 scale. Goldin (2016) and Easterly and Levine (2003) in agreement with Gallup et al. (1999) explained that countries located closer to the equator generally tend to have a more tropical climate. According to these literature, tropical regions are prone to high incidence of infectious and parasitic diseases, which, during the colonial era, were associated with extremely high mortality rates among European settlers. These sources agree that such geographically disadvantaged closed to equator tropical colonial environments subjected to heavy burden of infectious diseases became inhospitable for European colonizers. This fostered European colonizers to settle in small numbers and established predatory or extractive rent-seeking institutions that empowered the elites for exploitations of resources.

On the other hand, the institution's hypothesis by Acemoglu et al. (2001 & 2002) and Hall and Jones (1999) consider the geographical location of colonies for shaping colonization strategy and the types of initial institutional quality established by European settlers. They argue that European colonizers historically settled with a well-functioning high-quality inclusive institution in areas far from the equator and with better geographical conditions similar to Western Europe, which enable them to engage in processes that replicated European-type settlements and social adaptation.

In their studies, the above literature emphasised that using latitude as an instrument for domestic institutions to explain the causal effect of institutions on income, the exclusion restriction that must be satisfied is that latitude only affects current income through its historic effect on institutions. Thus, in this study, it is presupposed that the colonial legacy with respect to geography measured as latitude directly influences current institutions but has no direct effect on current poverty levels. Rather, the effect from latitude on poverty is felt through the impact on current institutions rather than directly influencing current poverty.

Indeed, such geographical location regulated institutions have had significant long-lasting effects on economic growth/development and thus poverty today in those former colonies, where settler colonies tended to produce post-colonial governments with inclusive institutions as opposed to the extractive institutional colonies, where the post-colonial elite cling to power making the pre-existing extractive institution even worse.

b. Commodity Export and Import Price Indices

This study employs, as instrumental variables, commodity exports and imports price indices from a database developed by Gruss and Kebhaj (2019), which are unique country-specific indices of prices by the value of exports and imports for a bundle of 45 exports and imports commodities weighed as a share of GDP. Gruss and Kebhaj (2019) in line with others (Burke and Leigh, 2010; and Pasaribu, 2020) have built on the evidence that countries grow faster when the prices of especially their exports increase. They argue that since these countries are typically price-takers for their commodity exports, the price variations/fluctuations that they do not have control over in the regional and international markets are considered exogenous in most instances to individual countries.

In line with Burke and Leigh (2010) and Pasaribu (2020), this study also argues that while commodity export or import price index is expected to be highly correlated with and have huge effect on economic growth and the measures of its compositions, it mainly affects other development outcomes like poverty through these channels. The study thus utilises the natural logarithm of and annualised log changes in commodity export or import price index to allow its effect on the measures of growth to be large or meaningful, especially for countries that are more dependent on commodity exports. See Gruss and Kebhaj (2019) for details about the international prices of the 45 individual commodities.

Also, from the perspective of individual countries, others (Arezki and Briickner, 2011; Berazneva and Lee, 2013; and Bellemare, 2015) put forward explanation that typically make commodity price indices to be consider exogenous. These authors argue that the rise in commodity prices, particularly those tradeable including agricultural, food and other natural resource-related products, has been associated with commodity shocks in several developing and emerging countries. The conceptual idea behind this is that an unpredictable shocks to the supply and demand of a commodity traded internationally, that occurs in one part of the world can affect such commodity prices. Accordingly, a change or fluctuation in world commodity prices, which is arguably exogenous to individual countries, makes it more or less likely to observe such commodity shocks in other parts of the world in the short term. Moreover, they argue that these shocks often originate from natural disaster such as war, earthquakes, epidemics, episodes of extreme temperature, flooding, wide fire, etc., which are highly correlated with economic growth and its compositions through which poverty can be affected.

In line with Pasaribu (2020), and as part of limitations, the chance for the exclusion restriction to be violated cannot be ruled out entirely. For example, the commodity price index is dominated in value terms by non-agricultural commodities such as crude oil. This makes its variation to affect the national real GDP growth, but a narrower base of incomes of the population of a country. Thus, such instruments largely address the potential bias in panel data regressions, as shown in demonstrated significant relationships between these instruments and the measures of growth in the first-stage regressions.

c. Lagged Values of the Measures of Growth

Following other empirical studies (King and Levine, 1993: Sharma, 2020; and Elbadawi and Sambanis, 2002), this study employs the use of lagged value of endogenous variables, especially GDP per capita or mean income and the sectoral compositions of economic growth as instrumental variables. In line with these sources, it is assumed that while the measures of growth belong to the model equations estimated in this study, they have contemporaneous direct effect on consumption income poverty. In this assumption, the lagged values of these measures of economic growth reflect that high (or low) values of the measures in previous years may affect the decisions and associated economic activities and hence the quantities of economic inputs and output that hurt the economy. Also, it is less likely that current poverty measures will reversely affect the lagged values of the measures of growth, and that these lagged values only affect poverty through the respective measures of growth in their current values. In agreement with the sources, there might admittedly be limitations of such instruments, especially for possible occurrence of serial correlation or autocorrelation between the lagged and current growth measures thereby contaminating the instrument and likely cause initial endogeneity.

However, the sources also suggest that such possibility becomes increasingly less or vanishes with much longer lags of these dependent variables such as by 2, 3, 4, 5, etc., lagged values. While this study did not analyse for these longer lag values due to limitations of sample observations, and recognising the limitations of the instruments in satisfying the exclusion restriction, results from the first-stage regressions demonstrate significant relationships between these lagged values and the current measures of growth. This calls for careful consideration in future research to account for such limitations using longer lags and the results compared across various lagged values.

2.3.4 Data Set and Variable Descriptions

The data used in this study was obtained from different sources for the period 1990–2020 on a total of 152 countries (including low- and middle-income countries) with 43 countries in Sub-Saharan Africa (SSA) and other regions. Included are 47 countries in Europe and Central Asia (ECA) (countries), 21 countries in East Asia and Pacific (EAP), 12 countries in Middle East and North Africa (MENA), 2 countries in North America (NA), 20 countries in Latin America and the Caribbean (LAC), and 7 countries in South Asia (SA). See **Appendix 5C1** for a detailed list of countries by region. The exception was where the choice of selection of a country was limited by the lack of data on measures of poverty (poverty spells) and other key model variables of interest. Obtaining data on all developing countries of the regions for the period covered in this study allowed for the comparative analysis of the patterns of poverty reduction in SSA with those in other regions. In line with Fosu (2015&2017), the period covered by the study is that which there seems to have been structural shift in terms of the growth performance of developing countries especially SSA relative to developed countries.

The dataset consists of data on variables for different measures of income poverty, per capita GDP or mean income growth, IQ, income inequality, and control and instrumental variables of interest. For this paper, the description of the data set is limited to the variables captured in the analytical framework/model(s).

The study used GDP per capita national account growth data from the Penn World Table (PWT) and the World Development Indicators (WDI) databases, and the national surveys mean income or consumption growth data from the World Bank Poverty Platform (formally PovcalNet). Following others (Kalwij and Verschoor, 2007; Adams, 2004; Besley and

Burgess, 2003; and Fosu, 2015 and 2017) and the current study empirical econometric model(s), the annualized log change in GDP per capita and mean income were used to match-up the variables with constructed poverty spells of different length, thereby allowing the econometric estimation of growth elasticities of poverty.

The dataset also utilizes internationally comparable poverty measures, mainly the poverty headcount indices, obtained from the World Bank PovcalNet or Poverty Platform database. This study focuses on two poverty headcount measures, $1.90 and $3.20 per day (2011 PPP) poverty headcounts. Since poverty can be found in low- and middle-income countries, using both $1.90 and $3.20 per day poverty headcounts allow the inclusion of more samples and hence increases the sample size in the analysis with reduced potential biases from changes in the rate of poverty (Hassan et al., 2006). While national survey-based poverty data is irregularly collected across countries, poverty spells were constructed and utilized to estimate the model parameters as done in the work of others (Kalwij and Verschoor, 2007; Bourguignon, 2003; Ravallion and Chen, 1997; and Ravallion, 1995). Essentially, poverty spells as defined in literature (Ravallion and Chen, 1997; Klasen and Misselhorn, 2008; and Lombardo, 2010) and adopted in this study are episodes or periods over which a number of people enter into poverty (characterized by their income falling below the poverty line) and leaving out of poverty (when their income rises above the poverty line). The poverty spells were constructed with duration of at least five years to enable the adopted estimation techniques to address econometric problems.

Although the approaches to measuring poverty continue to be widely debated, monetary poverty has intuitively remained the most prominent approach in measuring poverty. For instance, in addition to the relatively wider scale availability of data on monetary poverty measures, it can easily be translated into fulfillment of basic needs (Haslam et al., 2017; and Curtis and Cosgrove, 2018). They further argue that the use of money as the main indicator for poverty makes it possible for the measure to provide information about the number of people living in poverty as well as how poor they are and their locations.

The poverty measure used in this study, the absolute poverty line, mainly the poverty headcount index based on US$1.90 or US$3.20 a day (2011 PPP), remains the most intuitive and widely used measure in developing countries, especially low-income countries. It indicates the incidence/prevalence of poverty based on the proportion of the population living in poverty determined by the number of people in households with a per capita income below the poverty line. Even though being debated to be superficial in accounting for deprivations across a range of dimensions of public goods such as healthcare, schooling, housing, etc., Hulme (2015) and Haslam et al. (2017) revealed that measures of absolute poverty line represent the costs of a minimum basket of consumption expenditure on food items typically consumed to provide a daily caloric intake and on non-food items (such as shelter, clothing, and cooking fuel) based on consumption patterns.

Furthermore, while poverty is perceived to be more individualistic deprivation rather than groups (Stewart et al. 2007), monetary poverty measures make it possible for individual consumption, spending, or earning patterns to be aggregated to household level of monetary resources available in the household, which is then translated back to the individual level by dividing the total resources across all household members.

Also, this study chooses consumption monetary measure of poverty over the measure of income as a practice generally adopted for low- and middle-income countries (Curtis and Cosgrove, 2018). Indeed, sources have revealed that measuring consumption is more likely to produce accurate picture of deprivation than income measurement (Sahn and Younger, 2010; Curtis and Cosgrove, 2018). Consumption generally represents the usage of a variety of goods and services, possibly dealing with everything ranging from food to transportation (Curtis and Cosgrove, 2018), thus, households' consumption of such goods and services is a better indication of their standard of living than their incomes, which really serve to enable that consumption. The above literature has also pointed to additional reasons for adopting the use of consumption measures. Firstly, income fluctuates much more than consumption does. For instance, while earned income might be dependent on seasons in the year or whether conditions across years (years of drought will harm harvests and hence depress incomes), a basic level of consumption is maintained throughout the year. Also, where permanent jobs may provide the same monthly income, seasonal or temporary jobs may provide income at variable and unpredictable intervals. Secondly, Consumption and spending are less contentious to report and might be easier to track, while income can be difficult to calculate, especially in the poorest countries and so is usually under-reported in either high-income or low-income countries. This might be due to either people being reluctant to share their full earning information to avoid taxation on income or may not know the full extent of their income, particularly if there are multiple income sources. Thirdly, income may not take the form of money, particularly in developing countries. People could be paid for food items, for example, or could not be paid at all but survive on their own food production. However, taking consumption as the welfare measure would account for all food that is eaten, regardless of whether it is purchased with money or homegrown (Deaton and Grosh, 2000).

Of course, other related measures of poverty lines are available such as the poverty gap index (the depth of poverty represented by household or individual shortfalls from the poverty line), and squared poverty gap index (indicating severity of poverty that takes inequality among the poor into account, given greater weight to those further away from the poverty line). These two are derived from the headcount as the fundamental basis. However, this study chooses to use the poverty headcount index measured at US$1.90 or US$3.20 a day (2011 PPP) for respectively low-income and middle-income countries. Following Curtis and Cosgrove (2018), the reasons are that: First, this study relies on econometric specification derived from using the headcount index measure as the dependent variable. Second, the headcount poverty line measures are considered the most common metric that easily allows comparisons across different countries and societies after converted into the purchasing power parity (PPP) metric in United States Dollars (US$). The PPP US$ is a standardised and universally simple comparable unit in terms of prices and incomes across countries with different currencies, such that these units in one country are measured with the same yardstick in another country. Thus, the measures US$1.90 and US$3.20 a day (2011 PPP) enable cross-country comparison on the number of people in extreme and moderate poverty respectively. Third, in addition to its cross-country comparability, such poverty line monetary measures also allow connections of poverty measurement to overall inequality in empirical work.

Despite the gradual momentum of using multidimensional poverty measures in empirical research, Haslam et al. (2017) in agreement with others (Klasen, 2000; and Roelen, Gassmann, and Neubourg, 2009) argue that the inherent choices of incorporating multiple dimensions in poverty measures are normative and made implicitly. These make multidimensional poverty estimates susceptible to misinterpretations and controversies. For instance, the aggregation and the extent to which information on different dimensions should be combined into composite numbers/indices is one of the most contentious issues in measuring multidimensional poverty (Haslam et al., 2017). Indeed, Ravallion (2011) opposes such indices by denouncing the ambiguity in the choice of dimensions, thresholds, and weighting schemes that are aggregated from individual indicators into a composite index. Together, they argue that the construction of multi-dimensional poverty measures is scrutinized to the same degree as or even greater than the monetary measures. While raised the concern of practice around multi-dimensional poverty measurement to be much less harmonized, they also revealed that questions about the establishment of a welfare measure, poverty line, and poverty measure, and the respective steps followed in multi-dimensional poverty measuring are almost the same as those for monetary poverty.

For institutions, the study used the six governance institutional quality indicators obtained from the World Bank Worldwide Governance Indicators (WGI) database developed by Kaufmann et al. (2019). These institutional quality indicators, include voice and accountability, political stability and absence of violence, control of corruption, rule of law, regulatory quality, and government effectiveness is obtained from different sources.

Voice and accountability measures country performance on the ability of institutions to protect civil liberties, extent of citizens participation in the selection of government, independence of the media, equal opportunity for all, transparency of the business environment and government actions (including actions on budgeting), and the extent of institutional stability and accountability. **Political stability and absence of violence** measures country performance on the likelihood that the government is vulnerable to change through violent or overthrown by unconstitutional means. **Government effectiveness** measures country performance on the quality of public service provision, civil service independence from political pressures, and the government's capability for budgeting financial management and its ability/competence to plan and implement sound policies. **Regulation quality** measures country performance on the burden of regulations on business, price controls, the government's role in the economy, foreign investment regulation, and regulations on labour, trade, foreign currency, interest rates, price stability, tax systems, and private sector participation in infrastructure projects. **Rule of law** measures country performance on the extent to which the public has confidence in and abides by rules of society, incidence of violent and nonviolent crime, effectiveness and predictability of the judiciary, and the enforceability of contracts, security of property rights, and protection of intellectual property. **Control of corruption** measures country performance on the frequency of additional payments to get things done, the effects of corruption on the business environment, grand corruption in the political arena, and the tendency of elites to engage in state capture.

The WGI is selected over other institutional measures used in literature based on evidence originating from a theoretical hypothesis framework by Zhuang et al. (2010) emphasised in new institutional economics at the suggestions of Kasper and Streit (1998) and Weingast (1993). The framework hypothesised that societies should effectively establish a broad cluster of growth-enhancing and -inclusiveness formal institutions and policies that mutually reinforces each other. The framework provides the space for efficient and affordable costs in market transactions, enhanced control over the state, and effective support to private sector initiatives, market exchanges and investments, and economic development. Identified in the framework are accountability, rule of law, political stability, bureaucratic capability, contract enforcement and protection property rights, and control of corruption.

While these institutional measures align with the WGI, others (Acemoglu and Robinson, 2012; Perkins et al., 2013; Thorbecke, 2014; and Torvik, 2020) argue that put together these institutional indicators spread across and represent economic, political, social, and legal aspects of institutions that matter for promoting sustained growth and its inclusiveness for improved development outcomes. In addition to competitive and open markets, efficient taxes, and economic stability, these institutions have been also identified by scholars (Nissanke, 2015; Mishkin, 2015; Goldin, 2016; Coppock and Mateer, 2018; McConnell et al., 2018; Bernanke et al., 2019; and Larraín, 2020) as forms of institutions for the same reasons.

Also, efforts through inclusive growth frameworks towards achieving sustained and inclusive economic growth as well as reductions in poverty and inequality, have consistently emphasised the importance of strong and good governance institutions (ADB, 2011; AfDB, 2012; and Cerra, 2022). Broadly, Calderón and Fuentes (2012) describe governance as one that comprises different institutional dimensions guiding societies, such as enforcement of contracts, rule of law, quality of bureaucracy, absence of corruption, and democratic accountability, among others. Fosu (2013b) in a global study of country cases, identified good governance as a key strategy for achieving economic successes in developing economies including those in Africa. In his recent study, Fosu (2022) defines governance as the traditions and institutions by which economic and political authorities in a country are exercised through economic governance and political governance respectively.

According to Fosu (2022), economic governance comprises of economic freedom measured by indicators of size of government (expenditure, taxes, and enterprises), legal structure, protection of property rights, access to sound money, freedom of exchange with foreigners, and regulations (of credit, labour, and business). Similarly, political governance constitutes of electoral competitiveness, political rights and civil liberties, constraints on the executive branch of government, polity 2 (degrees of democracy versus autocracy), and political instability. In line with Alence (2004), Fosu (2022) argues that economic and political governance reinforces each other for effective development and hence refers to a combined cluster of both as developmental governance. As argued, developmental governance influences economic development, such as improvement in per capita growth and human development index, and reductions in poverty and inequality (Alence, 2004; and Fosu, 2022).

While emphasised the strong interdependence between political and economic governance through support of political system for economic governance to achieve effective economic development, they both (Alence, 2004; and Fosu, 2022) defined developmental governance to comprise of economic policy coherence (free-market policies), public-service effectiveness, and limited corruption. According to them, and in line with Torvik (2020), these three components of developmental governance essentially entail the six WGIs. Even though these six WGIs are governance oriented, they are closely related to the indicators of economic, political, social, and legal institutions, and in combination would represent a cluster of IQ dimension that would share common features and capable of enhancing sustained growth and its translation into socioeconomic development outcomes including PR.

Furthermore, variables and respective data on these governance indicators are largely obtained from widely used governance and institutional data sources including the Freedom House for civil liberties and political rights indices, World Economic Forum, International Country Risk Guide (ICRG), World Bank Doing Business, Heritage Foundation, International Monetary Fund, and the World Bank World Development indicators databases. These, put together, makes the WGI dataset most comprehensive for measures of institutions and governance. The data is sufficient and consistently available across countries for a length of period and covers several countries. Additionally, Borrmann et al. (2006) and Fanta (2011) argue that, while the sub-indicators are based on several hundred individual variables that are computed from 37 separate data sources constructed by 31 different organizations, it is likely that any error or bias in the data computation is relatively reduced compared to other data sources.

As employed in other studies (Alonso et al., 2020; Doumbia, 2019; Siyakiya, 2017; Moshiri and Hayati; 2017; Asongu and Kodila-Tedika; 2014; Tebaldi and Mohan, 2010; and Le et al., 2015) this study generated a weighted average institutional quality (IQ) index through principal component analysis (PCA) and used it as the main IQ indicator/variable. See in the next section (section 2.3.5) and Appendix 5B1 for the detailed PCA and discussions. The measured values of these indicators range from -2.5 to +2.5, with lower values indicating poor institutional quality and higher values implying good institutional quality.

The literature reviewed in this study generally reveals that PR depends on changes in growth rate and changes in income distribution (Ravallion, 1997; Besley and Burgess, 2003; Bourguignon, 2003; Adams, 2004; Kalwij and Verschoor, 2007; Lombardo, 2008; Thorbecke, 2013; and Fosu, 2015 and 2017). Thus, data on inequality, measured in Gini-coefficient/index is also capture in the study data set to control for changes in the distribution of income. In this way the elasticity of poverty cannot only be accounted for by the average growth, but also by how growth pattern affects income distribution.

Data on education index derived from the average of expected years of schooling index and the mean years of schooling index is used in logarithmic form of its initial value to represent the initial human capital. Other variable data captured are the instrumental variables (IVs) for both growth in GDP per capita and IQ, which are obtained from various sources to address endogeneity. A brief description of each of the variables and the respective sources and corresponding measurements are presented in **Appendix 5A.**

2.3.5 Analysis and Estimation Techniques

The analysis utilized STATA version 15 software packages across the study models used to enable comparison of results and robustness checks. The study at first utilized Pooled Ordinary Least Squares (POLS) to mitigate the erratic data problems due to the irregular nature of the national survey-based poverty data obtained across countries. While direct application of POLS estimation on such irregular data can neglect the dual nature of time-series and cross-sectional data and assumes a model of constant coefficients across time and cross-section (Gujarati, 2015), poverty spells, as defined in section 2.3.4, were then constructed to mitigate the difficulties that are likely to be faced in comparative analysis with irregular datasets (Ravallion and Chen, 1997).

Evidence revealed that over time, countries often improve/change the measurement methodologies of their household surveys, which affect the comparability of poverty estimates between the two years of poverty spells (Erumban and de Vries, 2021; and Ravallion and Chen, 1997). The regression procedures in this study thus excluded poverty spells with break that potentially would have affected the comparability of poverty estimates, by constructing poverty spells with a duration of at least five years to enhance the data set for estimations that allow the analysis to address econometric problems.

Since pooled OLS is assumed inadequate to addressing endogeneity problems, this study follows empirical work of others (Ravallion, 1995; Chong and Calderon, 2000; Gaiha and Katsushi, 2005; Tebaldi and Mohan, 2010; and Sembene, 2015) to combined pooled OLS with instrumental variable (IV) estimations. The study employs two-stage least-squares (2SLS) IV estimations to account for endogeneity issues that are potentially caused by omitted variable bias, reverse causality, and measurement errors in main regressors or explanatory variables of interest. Hence permit the possibility of making inferences with the observational data used and to account for both observed and unobserved effects (Gujarati, 2015; Wooldridge, 2020; Hong, 2020; & Stock and Watson, 2020).

Before constructing the poverty spells, the study utilized Principal Component Analysis (PCA) to construct a single but representative weighted average IQ index that shares common characteristics of all the dimensions of the WGI. Indeed, the six IQ indicators are strongly correlated with one another since they appear to measure the same broad governance concept (Ouedraogo et al., 2022; Qamruzzaman et al., 2021; Nawaz et al., 2014; and Langbein and Knack 2010). Thus, using the indicators simultaneously in one regression model can generate high multicollinearity problems. This study, like others (Alonso et. al., 2020; Doumbia, 2019; Siyakiya, 2017; Le et al., 2015; Easterly and Levine, 2003; Kaufmann et al., 2003; Easterly 2002; and Knack and Keefer, 1995) thus used IQ index.

In Appendix 5B1, the PCA result reveals that the IQ index largely shares common features of the six independent institutional World Governance Indicators (WGI) by extracting one main factor with eigenvalue 5.26489 to be retained. This is in line with the Kaiser Criterion (Kaiser, 1974), where the eigenvalue of the components to be retained should each be greater than one (≥1). Also, all the potential principal components formed are shown to explain all variances in all variables. This is evidenced by the Rho value = 1.00 from the principal components' correlation analysis, and by all the unexplained variances being zero each from the eigenvectors analysis shown in Appendix 5B1. In addition, the Kaiser-Meyer-Olkin (KMO) statistics, which show indications of measure of sampling adequacy, are at least 0.50 (above threshold) for each of the variables and the overall KMO statistic, showing evidence of appropriateness to use PCA (see Appendix 5B1). Moreover, the main factor with eigenvalue greater than one captures 87.43% of the variance, revealing that all the six indicators are loaded strongly on the selected factor. These results are further ascertained by Horn's (1965) parallel analysis, which is best for a more robust adjusted eigenvalue criterion to decide on the number of factors to extract by adjusting the original eigenvalues for sampling error-induced collinearity among the variables. Consistent with the Kaiser criterion, Appendix 5B1reveals that the one extracted factor displays adjusted eigenvalue that is larger than 1, which should be retained as a one-factor/component solution.

Mooi et al. (2018) however argue that applying the PCA approach to construct a few factors from many, like in this study reducing the six WGI indicators to one factor, may affect measurements. This is because the resulting factors cannot represent all the information included in the items. Hence, the 87.43% explained variance shows a 12.57% to be accounted for. This is consistent with Mooi et al. (2018) that it is practically impossible to use a single factor that represents all the information included in the six governance indicators. Thus, while the six WGI indicators may each represent different institutional dimensions (either political, economic, social, legal, or a combination), this study also uses these indicators individually to analyse their independent and interactive moderating effects and compare these with the results obtained from the use of weighted average IQ index.

The regression results are analysed and discussed at global sample level, which also accounts for cross-regional analysis using regional dummy variables in the global sample to compare results across regions for both $1.90 and $3.20 per day poverty headcounts. In addition to regional analysis, the study also employs cross-country level analysis for the SSA sample, despite the limited included sample observations of the measures of poverty for SSA countries. In both global (with regional or non-regional dummies) and SSA samples, the study analyses results for the main standard model and for robustness test, the Bourguignon models that respectively correspond to equations 5 and 9 of the empirical specification equations.

In regression analyses for both global and SSA samples, the study assesses, by testing the hypothesis that whether the impact of GDP per capita or mean income growth rates, IQ, and the interaction terms between the two on PR is negatively and statistically significant or not at global level and in SSA relative to other regions. Results are compared across the three measures of growth used in the study.

For each measure of growth, the first and second estimation equations correspond to equations 5 or 9 of the empirical model equations respectively for the main standard model or robustness Bourguignon model across the measures of growth (**see columns 1 to 6 of Tables 1.2d & 1.4**). The two estimation equations present the global sample view for models with non-regional dummies and the other models that control systematically for regional dummies. The inclusion of regional dummies in the estimation is to determine whether the level of poverty-reducing effect of the measures of GDP per capita or mean income growth rates, IQ, and the interaction terms of the two on PR in the global sample significantly differs between SSA and other regions across the world.

The third estimation equation for each of the measures of growth, which are employed and focused on analysis of cross-country level sample, replicates the first estimation equation, but limited to countries in the SSA sample (**see columns 7 to 9 of Tables 1.2d & 1.4**). These estimations examine whether there is significant evidence of the effect of each measure of GDP per capita or mean income growth on PR. They also examine whether IQ in its interaction with measures of growth significantly influences the poverty-reducing effect of growth in the SSA region.

2.4 Empirical Results and Discussions

2.4.1 Descriptive Statistics

Table 1.1 presents descriptive statistics for the minimum available samples at both global and regional levels for countries included in the analysis. In the global sample, Table 3.1 shows that the mean levels of poverty headcounts at $1.90/day and $3.20/day are respectively 0.0883 and 0.1733, which ranges from a minimum of 0.0000 (no poor) to a maximum of 0.9428 and 0.9855 (almost all poor) for $1.90/day and $3.20/day respectively. Across regions, the lowest mean level of poverty headcount at $1.90/day and $3.20/day is observed in North America (NA) at 0.0064 and 0.0080 (less poor) respectively, while the largest mean level of poverty headcount at $1.90/day and $3.20/day is observed in Sub-Saharan Africa (SSA) at 0.4460 and 0.6688 (evidence poor) respectively.

For the level of IQ, the average level in the global sample is $+4.04x10^{-10}$. This appears to be spread across regions. Relatively, the lowest mean level of IQ is found in SSA (-0.9599), while the highest and relatively better mean level is observed in the NA (+1.3273).

Regarding EG in the global sample, Table 1.1 reveals that the mean annual per capita national account Penn World Table (PWT) growth and World Development Indicator (WDI) growth are respectively $20457.53 (minimum of $463.26 and maximum of $101544.2) and $16383.45 (minimum of $236.46 and maximum of $112417.90). Similarly, the PovecalNet mean income at global level is $21.6875 per day, which ranges from a minimum of $0.7430 per day to a maximum of $85.4040 per day.

Across regions, Table 1.1 shows the least mean annual per capita PWT national account growth of $3783.29 to be observed in SSA and the largest being $46901.02 in NA. Also, the least mean annual per capita WDI national account growth of $1723.88 observed in SSA and a maximum of $44587.91 in NA. Similar trend is revealed for the PovecalNet mean income, where it can be seen in Table 1.1 that the least mean income of $3.9521 per day is found in SSA seconded by South Asia (SA) with $5.0275 per day while the largest mean income of $57.3678 per day is observed in NA followed by $28.8974 per day in Europe and Central Asia (ECA).

Table 1.1: Descriptive Statistics

	Obs	Mean	St.Dv.	Min	Max	Obs	Mean	St.Dv.	Min	Max
Global						**Middle East & North Africa**				
Level of poverty headcount at $1.90/day	1,510	0.0883	0.1676	0.0000	0.9428	80	0.0186	0.0301	0.0000	0.1827
Level of poverty headcount at $3.20/day	1,510	0.1733	0.2486	0.0000	0.9855	80	0.0936	0.1200	0.0000	0.5120
Level of Mean income growth	1,510	20457.53	17739.37	463.2592	101544.2	80	18001.39	14411.74	1092.037	83828.62
Level of PWT growth per cap. (Pwtgdp)	1,510	16383.45	20297.93	236.4607	112417.9	80	13363.39	13023.78	1292.893	41420.03
Level of WDI growth per cap. (Wdigdp)	1,510	21.6875	18.8214	0.7430	85.4040	80	20.3068	16.0863	4.1190	82.9602
Institutional Quality (IQ)	1,510	$4.04x10^{-10}$	1.0000	-2.5705	1.9042	80	-0.3633	0.9545	-2.2342	1.1246
East Asia & Pacific						**North America**				
Level of poverty headcount at $1.90/day	112	0.1106	0.1550	0.0000	0.6627	42	0.0064	0.0036	0.0023	0.0125
Level of poverty headcount at $3.20/day	112	0.2737	0.2677	0.0010	0.9003	42	0.0080	0.0038	0.0024	0.0150
Level of Mean income growth	112	13200.17	12355.48	1429.178	54053.24	42	46901.02	7687.749	32637.03	62729.11
Level of PWT growth per cap. (Pwtgdp)	112	7727.105	12344.52	669.3389	58441.95	42	44587.91	8175.24	30574.58	60698.01
Level of WDI growth per cap. (Wdigdp)	112	12.1244	12.8513	1.8533	58.4366	42	57.3678	8.9163	41.9478	80.7665
Institutional Quality (IQ)	112	-0.4232	0.6906	-1.6110	1.5748	42	1.3272	0.2158	0.8026	1.5849
Europe & Central Asia						**South Asia**				
Level of poverty headcount at $1.90/day	810	0.0174	0.0559	0.0000	0.6069	38	0.1739	0.1629	0.0000	0.6603
Level of poverty headcount at $3.20/day	810	0.0513	0.1169	0.0000	0.8604	38	0.4801	0.2399	0.0000	0.8868
Level of Mean income growth	810	28206.43	18056.24	1237.937	101544.2	38	5779.291	4352.052	1484.064	19411.13
Level of PWT growth per cap. (Pwtgdp)	810	23794.16	23269.91	407.2249	112417.9	38	2156.778	2212.654	492.5623	10217.47
Level of WDI growth per cap. (Wdigdp)	810	28.8974	19.1562	2.0655	85.4040	38	5.0275	3.1635	1.9636	17.6303
Institutional Quality (IQ)	810	0.4119	0.9681	-1.9169	1.9042	38	-0.8202	0.5042	-1.6076	0.3195
Latin America & Caribbean						**Sub-Saharan Africa**				
Level of poverty headcount at $1.90/day	271	0.0901	0.0802	0.0005	0.6315	157	0.4460	0.2298	0.0021	0.9428
Level of poverty headcount at $3.20/day	271	0.1889	0.1273	0.0037	0.7988	157	0.6688	0.2230	0.0107	0.9855
Level of Mean income growth	271	10034.68	5279.889	1068.536	29920.35	157	3783.293	4641.009	463.2592	25309.86
Level of PWT growth per cap. (Pwtgdp)	271	6280.048	3575.707	1173.795	17394.15	157	1723.876	2350.556	236.4607	16110.99
Level of WDI growth per cap. (Wdigdp)	271	12.8431	5.0304	2.6568	27.5411	157	3.9520	3.1905	0.7430	22.0388
Institutional Quality (IQ)	271	-0.4658	0.5792	-1.5649	1.0387	157	-0.9599	0.6253	-2.5705	0.6573

2.4.2 Correlation Analysis

The scatterplots discussed are displayed in Appendices 1A1 to 1A4. In Appendices 1A1 and 1A2, the measures of per capital annual PWT and WDI growth rates appear to be moderately correlated with the annual rate of change of poverty headcount at $1.90/day in the global sample. A similar nature of correlation is observed between the rate of change of poverty and per capita PWT and WDI growth rates in the regions of EAP, ECA, and LAC, but there seems to be weak or no correlation in the other regions, especially in SSA. On the contrary, there apper to be strong correlation between the rate of change of poverty and the annual per capita PovcalNet mean income growth rates at global level and across other regions except in SSA with weak correlation as shown in Appendix 1A3. Also, in Appendix 1A4, the measures of the initial level of IQ index appear to generally show weak correlation with the annual rate of change of poverty at the global level and across all other regions except in ECA and NA where somewhat positive correlations can be seen. While correlation analysis results only provide evidence of the extent of association and not causal relationships on the extent to which the level of IQ or per capital growth can reduce poverty, the above results remain indications and can only be confirmed by empirical regressions in the next sections.

2.4.3 Regression Results

2.4.3.1 Test for Endogeneity and Instrument Validity

While the increased concerns over data quality in especially developing countries, this study in addition to Pooled Ordinary Least Squares (POLS) technique, also employed instrumental variable (IV) estimation method to address endogeneity issues associated with data. This is because POLS results are sometimes biased. The study thus employed endogeneity and instrument validity/relevance/strength tests to determine the consistency and efficiency of the regression estimation results that are preferred. This section presents analysis of the test results on the preference of either IV and POLS regression results and hence discusses the preferred estimation results for both global and Sub-Saharan Africa (SSA) sample models at \$1.90 and \$3.20 per day poverty headcounts.

For the test of endogeneity of models and potential endogenous variables, which is simply conducted to test if the regressors are uncorrelated with the error term, this study followed the recommendations of various sources (Baum, 2006; Kennedy, 2008; Cameron and Trivedi, 2009; Gujarati, 2015; Wooldridge, 2020; Stock and Watson, 2020; & StataCorp Reference Manual, 2023). In line with these sources, the Durbin-Wu-Hausman (DWH) (Durbin, 1954; Wu, 1973; & Hausman, 1978) test was conducted, which also has the advantage of testing for endogeneity for models with more than one endogenous variable. While there are potentially multiple endogenous variables (including the measures of growth and IQ, and the terms of interaction of the two), the tests evaluate whether any or all of these variables and the respective models as a whole are endogenous or exogenous.

The first step included the tests conducted using the Standard model regression without IQ terms, to ascertain whether the measures of growth are actually endogenous or exogenous. As a rule of thumb for Durbin-Wu-Hausman test, if the test statistic is significant (p-value < 0.05), the test result then considers the model or variable(s) tested to be endogenous.

To test whether the instrument(s) is(are) uncorrelated with the error term, Kennedy (2008) argues that in the just or exactly identified case, where there is only one instrument for each endogenous variable in the model as in the case of this study, accurate tests are impossible. Rather, researchers in such circumstances should rely on logical reasons that lie behind the choice of instrument(s) based on economic theory or the context of the application. As done in this study, see previous section **(section 2.3.3)** for detailed discussions on theoretical and conceptual reasons for the selected IVs to meet exclusion restrictions.

For the test of validity of instruments, which depends on the strength of instrumental variables used for the suspected endogenous regressors, and gives final verdict on the DWH test results, this study followed others (Bound et al.,1995; Shea, 1997; Baum et al., 2003 & 2007; Baum, 2006; Kennedy, 2008; Cameron and Trivedi, 2009; Adkins & Hill, 2011; StataCorp Reference Manual, 2023). According to these sources, for regression models with one endogenous variable, the issues of endogeneity are simplified and justified by the Stock and Yogo (2005) threshold of t-value ≥3.2 and F-statistic ≥10, revealing that the instrument(s) used is/are valid and hence explain a meaningful fraction of variability in the regressor. The selected IVs utilised and the respective Durbin-Wu-Hausman tests and first-stage regression results are presented in Table 1.2a below for non-regional dummy standard model regression without IQ terms to determine whether the measures of growth are endogenous or exogenous and whether the instruments used in this case are valid or not.

Table 1.2a: Test for Endogeneity and Instrument Validity for non-Regional Dummy Models without IQ Terms at $1.90/day Poverty Headcount Measure in Global and Sub-Saharan Africa Samples

	PWT Per capita Growth (dPwtgdp)		**WDI Per capita Growth (dWdigdp)**		**Mean Income Growth (dMean)**	
	Global sample without regional dummies	**Sub-Saharan African (SSA) sample**	**Global sample without regional dummies**	**Sub-Saharan African (SSA) sample**	**Global sample without regional dummies**	**Sub-Saharan African (SSA) sample**
Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)	Ho: variables are exogenous: Durbin (score) chi2(1) = **(p = 0.6263)** Wu-Hausman F(1,603) = **(p = 0.6279)**	Ho: variables are exogenous: Durbin (score) chi2(1) = **(p = 0.3982)** Wu-Hausman F(1,109) = **(p = 0.4091)**	Ho: variables are exogenous: Durbin (score) chi2(1) = **(p = 0.8608)** Wu-Hausman F(1,208) = **(p = 0.8626)**	Ho: variables are exogenous: Durbin (score) chi2(1) = (**p = 0.6029**) Wu-Hausman F(1,58) = (**p = 0.6188**)	Ho: variab are exogenous: Durbin (score) chi2(1) = **(p =0.4548)** Wu-Hausman F(1,208) = (**p = 0.4604**)	Ho: variab. are exogenous: Durbin (score) chi2(1) = **(p = 0.8492)** Wu-Hausman F(1,112) = (**p = 0.8527**)
First Stage Regressions						
Endogenous variables	**dPwtgdp**	**dPwtgdp**	**dWdigdp**	**dWdigdp**	**dMean**	**dMean**
Instrumental variables						
Annualized log change in commodity exports price index (dx_gdp)	1.800*** (0.163)	1.688*** (0.385)				
Lagged value of WDI Per capita Growth (dWdiGdp_1)			0.576*** (0.048)	0.298*** (0.100)		
Lagged value of annualised log change in mean income growth (dMean_1)					0.334*** (0.056)	
Natural logarithm of commodity imports price index (lnm_gdp)						0.2654** (0.1214)
Observations	608	114	213	63	213	117
R-square	0.1705	0.1513	0.4215	0.1619	0.1606	0.0655
Test for Instrument Validity						
t-value	11.04	4.38	12.03	2.98	5.93	2.18
F-value	121.776	19.1457	144.825	8.87174	35.203	4.77272
Prob > F	0.0000	0.0000	0.0000	0.0042	0.0000	0.0310

Notes: *dPwtgdp = Annualised Log change in per capita PWT (Penn World Table) GDP growth; dWdigdp = Annualised Log change in per capita WDI (World Development Indicator) GDP growth; and dMean = Annualised Log change in mean income growth*

It can be seen in Table 1.2a that the Durbin-Wu-Hausman tests p-value results in the global and SSA samples across the measures of growth in per capita GDP or mean income are all greater than 0.05, revealing that the models and regressors tested are exogenous. In terms of validity and relevance of instruments, results show that the Stock and Yogo (2005) threshold of t-value ≥3.2 and F-statistic ≥10 are almost met for all other regressors in the global and SSA samples, except for the SSA sample mean income growth (dMean) that falls short. However, the result for this short fall also demonstrates significant relationships between dMean and the selected instrument (natural logarithm of commodity import price index), which calls for attention in future research. Put together, these results reveal that the instruments used are valid and hence explain a meaningful fraction of variability in the regressors.

For multiple endogenous variables, these sources argue that the complexity of diagnostics increases, as each of the instruments would have to play critical role in each first-stage regression. This consequently result in over/undersized first stage R-square (R^2) and F-statistics values, and as such over/under state the relevance of the excluded instruments. In response to overcoming the issues that arise, Bound et al (1995) proposed the use of partial R-square test- statistic, which is the squared correlation between the components of exogenous variables to determine instrument relevance amongst set of instruments.

However, the partial R-square test is more applicable for one endogenous variable with many instruments and cannot measure intercorrelations amongst exogenous and endogenous variables. Thus, as adopted in this study for multiple instruments validity and as suggested by others (Baum et al., 2003 & 2007; Baum, 2006; and StataCorp Reference Manual, 2023), a more general test that is built on the concept of "partial correlation", the Shea's partial R^2 statistic, proposed by Shea (1997) for models with more than one endogenous variable is conducted. This statistic takes the intercorrelations among instruments into account, thereby measuring the "partial correlation". A rule of thumb by Baum (2006) is that if there is large value of partial R^2 and a small value of the Shea's partial R^2 measure, then the instruments are insufficient to explain all the endogenous variables.

Moreover, with multiple endogenous explanatory variables, mainly two potential endogenous variables and the corresponding interaction terms in the empirical analysis models, the study, followed others (Baum, 2006; Cameron and Trivedi, 2009; Adkins & Hill, 2011; Gujarati, 2015; Hill et al., 2018; and Wooldridge, 2020) to appropriately employ the use of multiple instruments. These sources argued that multiple IV estimation with multiple regressors must require at least as many instrumental variables as there are endogenous variables. Indeed, Kennedy (2008) and Stock and Watson (2020) argue that if there is exact identification with exogenous instruments, then a legitimate IV estimate is produced (with one IV for each regressor), because no comparison is possible since different IV estimate cannot be calculated. With this, the Sargan test is impossible in this study, since it is tied to implicitly making comparison among two or more instruments for the same regressor to test whether one or more of the instruments is exogenous. In line with these sources, this study used model parameters that are said to be just-identified or exactly identified where the number of IVs equals the number of endogenous variables.

Tables 1.2b and 1.2c present results of a series of test-statistics described above for endogeneity of independent variables of interest and the validity of instruments used. The results presented in Tables 1.2a for exogeneity of the measures of growth and validity of the instruments have been used to produce analyses presented in Tables 1.2b and 1.2c, which respectively present results from test of endogeneity and instrument validity in model regressions with non-regional and regional dummies as well as IQ terms.

Based on the various endogeneity test-statistic results shown in Tables 1.2b and 1.2c, only in the non-regional dummy global sample model regressions with IQ terms in Table 1.2b for PWT per capita GDP growth and mean income growth preferred the IV estimation results to be consistent. All other model regressions across the measures of growth preferred pooled OLS estimation results to be consistent. Also, results from combination of various tests conducted including the Durbin-Wu-Hausman endogeneity test, and the values and significance of the t- and F-statistics, as well as the magnitude of the differences between the partial R^2 and Shea's partial R^2 statistics from the first-stage regressions are also presented in Tables 1.2b and 1.2c. These results are within the specified theoretical limits discussed above and reveal that the model regressions that preferred IV estimation results have endogenous variable(s), while those that preferred pooled OLS estimation results have exogenous variables. Moreover, the test results show that the instruments used are adequate to extract the exogeneity components and meaningfully explain the suspected endogenous variables. The unpreferred POLS regression results can be found in Appendices 1B4 and 1B5.

Table 1.2b: Test for Endogeneity and Instrument Validity for non-Regional Dummy Models with IQ Terms at $1.90/day Poverty Headcount Measure in Global Sample

Global Sample Analysis	**Global Sample PWT Per capita Growth (dPwtgdp)**		**Global Sample WDI Per capita Growth (dWdigdp)**		**Global Sample Mean Income Growth (dMean)**	
*Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)*	Ho: variables are exogenous Durbin (score) chi2(2) **= (p =0.0003)** Wu-Hausman F(2,455) **=(p = 0.0003)**		Ho: variables are exogenous Durbin (score) chi2(2) = **(p= 0.1738)** Wu-Hausman F(2,490) **= (p= 0.1777)**		Ho: variables are exogenous Durbin (score) chi2(2) **= (p =0.0008)** Wu-Hausman F(2,490) **= (p = 0.0008)**	
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV	**Prob>chi2 = 0.0058**		**Prob>chi2 = 0.4360**		**Prob>chi2 = 0.0025**	
First Stage Regressions						
	IQ	**IQ*dPwtgdp**	**IQ**	**dWdigdp**	**IQ**	**dMean**
Instrumental variables						
Abs. latitude (Lat_abs)	2.1807***		2.4539***		1.9262***	
	(0.2508)		(0.2445)		(0.2261)	
(Lat_abs)*(dPwtGdp)		2.0099***				
		(0.2340)				
(Lat_abs)*(dWdiGdp)				-0.0276***		
				(0.0087)		
(Lat_abs)*(dMean)						1.2701***
						(0.1947)
Constant	-0.1628	0.0465***	-0.2476**	0.0261***	-0.1811	0.0128**
	(0.1285)	(0.0071)	(0.1242)	(0.0044)	(0.1191)	(0.0050)
Observations	463	463	498	498	498	498
R-squared	0.5410	0.5263	0.5606	0.4162	0.5050	0.3939
Test for Instrument Validity						
t-value for instrument	8.69	8.59	10.03	-3.18	8.52	6.52
F-value	39.4818	41.548	52.743	42.8359	37.5328	33.2782
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Partial R-Square	0.1473	0.1539	0.1765	0.1483	0.1324	0.1192
Shea's Partial R-Square	0.1989	0.2077	0.2557	0.2148	0.1527	0.1374
Sub-Saharan Africa Sample Analysis	**SSA Sample PWT Per capita Growth (dPwtgdp)**		**SSA Sample WDI Per capita Growth (dWdigdp)**		**SSA Sample Mean Income Growth (dMean)**	
*Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)*	Ho: variables are exogenous Durbin (score) chi2(1) **= (p =0.3982)** Wu-Hausman F(1,109) **= (p = 0.4091)**		Ho: variables are exogenous Durbin (score) chi2(2) **= (p = 0.6059)** Wu-Hausman F(2,82) **=(p = 0.6319)**		Ho: variables are exogenous Durbin (score) chi2(2) **=(p=0.8954)** Wu-Hausman F(2,82) **=(p=0.9041)**	
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV	**Prob>chi2 = *0.6206***		**Prob>chi2 = 0.5344**		**Prob>chi2 = 0.9735**	
First Stage Regressions						
	IQ	**IQ*dPwtgdp**	**IQ**	**dWdigdp**	**IQ**	**dMean**
Instrumental variables						
Absolute latitude (Lat_abs)	2.8861***		2.5975**		2.3491***	
	(0.9822)		(1.2118)		(0.8454)	
(Lat_abs)*(dPwtGdp)		2.2191				
		(1.4588)				
(Lat_abs)*(dWdiGdp)				3.3481**		
				(1.3895)		
(Lat_abs)*(dMean)						3.2605***
						(.6825)
Constant	-0.6647***	0.0286***	-0.7074	0.0229***	-0.6351***	0.0081
	(0.2169)	(0.0103)	(0.2423)	(0.0078)	(0.1959)	(0.0063)
Observations	88	88	90	90	90	90
R-squared	0.3392	0.8631	0.3419	0.7367	0.3657	0.7849
Test for Instrument Validity						
t-value for instrument	2.94	1.52	2.14	2.41	2.78	4.78
F-value	8.68059	2.34869	9.86973	7.27954	9.79772	23.5476
Prob > F	0.0004	0.1019	0.0001	0.0012	0.0001	0.0000
Partial R-Square	0.1747	0.0542	0.1903	0.1477	0.1892	0.3592
Shea's Partial R-Square	0.1472	0.0456	0.1120	0.0869	0.0621	0.1180

Robust standard errors in parentheses; and *** p<0.01, ** p<0.05, * p<0.1)

***Notes:** dPwtgdp = Annualised Log change in per capita PWT (Penn World Table) GDP growth; dWdigdp = Annualised Log change in per capita WDI (World Development Indicator) GDP growth; and dMean = Annualised Log change in mean income growth*

Table 1.2c: Test for Endogeneity and Instrument Validity for Regional Dummy Models with IQ Terms at $1.90/day Poverty Headcount Measure in Global Sample

	Global PWT Per capita Growth (dPwtgdp)		**Global WDI Per capita Growth (dWdigdp)**		**Global Mean Income Growth (dMean)**	
*Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)*	Ho: variables are exogenous Durbin (score) chi2(3) **= (p =0.0451)** Wu-Hausman F(2,449) **=(p = 0.0486)**		Ho: variables are exogenous Durbin (score) chi2(2) **= (p =0.8086)** Wu-Hausman F(2,484) **= (p = 0.8134)**		Ho: variables are exogenous Durbin (score) chi2(2) **=(p=0.1277)** Wu-Hausman F(2,484) **=(p=0.1342)**	
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.0220**		**Prob>chi2 = *0.7056***		**Prob>chi2 = 0.4597**	
First Stage Regressions						
	IQ	**IQ*dPwtgdp**	**IQ**	**IQ*dWdigdp**	**IQ**	**IQ*dMean**
Instrumental variables						
Absolute latitude (Lat_abs)	2.0928*** (0.2580)		2.2451*** (0.2452)		1.6965*** (0.2288)	
(Lat_abs)*(exogenous dPwtGdp)		2.5584*** (0.3632)				
(Lat_abs)*(exogenous dWdiGdp)				2.7851*** (0.3536)		
(Lat_abs)*(exogenous dMean)						2.3928*** (0.3459)
Constant	-0.1106 (0.1374)	0.0309*** (0.0073)	-0.1264 (0.1283)	0.0256*** (0.0046)	-0.0533 (0.1236)	0.0130 (0.0052)
Observations	463	463	498	498	498	498
R-squared	0.5622	0.5815	0.5943	0.4585	0.5300	0.4323
Test for Instrument Validity						
t-value for instrument	8.11	7.04	9.16	7.88	7.41	6.92
F-value	41.1668	25.9544	57.1548	31.2253	35.2848	30.0182
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Partial R-Square	0.1544	0.1032	0.1904	0.1139	0.1268	0.1099
Shea's Partial R-Square	0.2295	0.1534	0.2997	0.1792	0.1179	0.1022

Robust standard errors in parentheses; and *** p<0.01, ** p<0.05, * p<0.1)

Notes: *dPwtgdp = Annualised Log change in per capita PWT (Penn World Table) GDP growth; dWdigdp = Annualised Log change in per capita WDI (World Development Indicator) GDP growth; and dMean = Annualised Log change in mean income growth*

Also, as robustness test, Appendices 1E1 and 1E2 respectively present the IVs used and respective Hausman tests results for endogeneity and first-stage regression test results for instrument validity in respectively the non-regional and regional dummy global sample regressions for the Bourguignon models with IQ terms. Also, Appendix 1E3 presents results from similar tests in SSA sample regressions for the Bourguignon model with IQ terms. From the various Durbin-Wu-Hausman endogeneity tests, all model regressions across the measures of growth preferred pooled OLS estimation to be consistent. For validity of IVs, there are highly significant correlations between the instruments and regressors. Additionally, the values of t- and F-statistics, and the differences between the partial R^2 and Shea's partial R^2 statistics from the first-stage regressions as revealed in Appendices 1E1 to 1E3 are found to be within the specified theoretical threshold limits discussed above. The results reveal that the models and regressors are exogenous, and that the instruments used are valid and meaningfully explain the regressors.

2.4.3.2 Regression Results and Discussions

Columns 1, 3, and 5 of Table 1.2d reveal that in non-regional dummy global sample regression models, the growth elasticity of poverty is as expected negative and statistically significant across the three different growth models. A one percent increase in each of the measures of growth contributes to a reduction in extreme poverty ($1.90/day poverty headcount) by 3.3, 2.9, and 3.8 percent respectively in the PWT and WDI per capita GDP and PovcalNet mean income growth models. The results are consistent with findings from other empirical studies (Ravallion, 1995; Roemer and Gugerty, 1997; Gallup et al., 1999; Warr, 2000; Dollar and Kraay, 2002; Adams, 2004; Kraay, 2006; Kalwij and Verschoor, 2007; Dollar et al., 2013 & 2016; and Fosu, 2017 and 2018), which showed that EG contributes significantly to PR.

In global sample regression models with regional dummies, Table 1.2d (columns 2, 4, & 6) shows that the growth elasticity of poverty is negative and statistically significant in all other regions across the different growth models, except in North America (NA) where it is found to be insignificant. The insignificant growth elasticity of poverty in NA may be due to the two countries included in the study with zero or minimal proportion of the populations in extreme poverty. Moreover, the relatively lower growth elasticity of poverty is found in SSA, especially across the WDI per capita GDP and PovcalNet mean income growth models. For the PWT per capita GDP growth model, column 2 of Table 1.2d reveals that a one percent increase in per capita GDP reduces poverty by 3.7, 2.8, 1.7, 2.8, 2.7, and 2.5 percent in EAP, Europe and Central Asia (ECA), LAC, MENA, SA, and SSA respectively. With respect to the WDI per capita GDP growth model, column 4 of Table 1.2d shows that a one percent increase in per capita GDP reduces poverty by about 3.5, 3.1, 2.3, 2.3, and 1.5 percent in EAP, ECA, LAC, MENA, SA, and SSA respectively. In terms of the PovcalNet growth model, column 6 of Table 1.2d reveals that a one percent increase in mean income reduces poverty by 3.6, 3.3, 1.9, 2.8, 3.8, and 1.6 percent in EAP, ECA, LAC, MENA, SA, and SSA respectively. Essentially, the smallest growth elasticity of poverty is observed in SSA across the different growth models. This broadly support results from other empirical studies (Ravallion and Chen, 1997; Besley & Burgess, 2003; Kalwij and Verschoor, 2007; Bicaba et al., 2015; Sembene, 2015; Fosu, 2017; and Adeleye et al., 2020), which found that the poverty-reducing effect of growth varies across regions, with the least effect observed in the SSA.

Despite accounting for income inequality across the different growth models in this study, the growth elasticities obtained across these models are relatively larger at global and regional levels, compared with those obtained in literature. Indeed, even the smallest growth elasticities of poverty observed in SSA across growth models are relatively larger in size than those found in literature (Kalwij and Verschoor, 2007; and Fosu, 2017). This might be due to the presence of institutional quality (IQ) terms in the models, revealing the possibility of such meaningful growth effects on PR being fueled by improved institutional quality environment. Such observation is consistent with the work of Khan (2011) on good governance and distribution in a working paper on Governance, Growth and Poverty Reduction. Khan (2011) argued that it is possible for good governance reforms to improve income distribution in poor countries, even in cases where good governance reforms may have an anomalous effect on growth. In line with Khan (2011), since income distribution is arithmetically related to poverty and growth, an increased growth with increased income distribution would consequently cause the increased impact of growth on poverty reduction. This, as Khan revealed, is primarily possible in two ways: First, through good governance reforms focusing on pro-poor service delivery as a way of government accountability through investment in human capital and increased access of the poor to potential resources for increased employment/job opportunities. Second, through the protection of property rights, efficient rule of law, democratization and anti-corruption policies. These two pathways, as he argued, theoretically allow the poor to protect their rights better, demand better services from the state, and ensure that a greater part of the public goods that they are entitled to are in fact delivered.

In columns 1 to 6 of Table 1.2d, the effect of independent institutional quality (IQ) level is positive and statistically significant across the different growth models in global samples with and without regional dummies. This is in line with a study result by Gaiha and Imai (2005) on South Asia, who found a positive effect of IQ on poverty and argued that in such a case it may be possible for IQ to have negative effect on poverty but only through higher income. However, their results and findings from this study contradict results from most other studies in literature (Chong and Caldero´n, 2000b; Tebaldi & Mohan, 2010; Perera & Lee, 2013; Asongu and Kodila-Tedika, 2014; Cepparulo et al., 2017; and Fagbemi et al., 2020), which argue that increased IQ significantly contributes to PR.

While the effects of the terms of interaction between the measures of IQ and growth on poverty to be negative and statistically significant, the independent effect of IQ across regression models is positive and statistically significant, means that increased institutional quality tends to be poverty-reducing in the long-run rather than in the short-run. This is consistent with the earlier explanation of Kuznets's (1955) theoretical hypothesis of the inverted-U shaped relationship between economic inequality and the level of development measured in GDP per capita growth. According to this hypothesis, in the process of economic development, inequality increases at the initial stage while GDP per capita growth is increased but only benefits a small segment of the population at that stage. However, in the long-run, while growth increases, the inequality subsequently declines as larger proportion of the population gain employment in the high-income sector. Despite the future gains associated with the Kuznets (1955) theoretical hypothesis, Weil (2013) argues that economists are essentially care about income inequality because it is related to poverty. He posits that if the average level of income per capita in a country is maintained, a higher degree of income inequality will be observed and consequently make poor people worse off. Based on such observation, Weil (2013) emphasised that, if for poor countries, an increase in income per capita also means an increase in inequality, then it is theoretically possible that economic growth can be bad for the poorest people in a country.

Intuitively, institutional reforms and its effective functioning come along with technological change, new innovative firms and service delivery across sectors, and increased demand for institutional infrastructure and skilled human capacity that often reduces the need for old/traditional ones. In developing countries, these initially result in a reduction in employment in formal and informal sectors and thus in income, which would eventually increase poverty. For instance, Khan (2007) argues that setting up institutional mechanisms like market-enhancing governance institutions would require significant expenditures of public resources to ensure the critical state capabilities needed. The resources could be invested in establishing and maintaining efficient markets with reduced transaction costs, good rule of law and effective contract enforcement and property rights, and to restrict the activities of states to the transparent and accountable provision of necessary public goods quality service delivery to minimize corruption and expropriation. This means that, while developing economies have limited fiscal resources, they would still be required to do critically important resource re-allocations to match such early stages of development in order to achieve these institutional reform-based goals, especially private investor-led, for economic development to take off. Such re-allocated resources may reduce for example, opportunities of investment in sectors that could create immediate employment or create innovative social protection interventions that might easily increase incomes of people, and hence PR. The resource re-allocation to institutional capability enhancement for future economic development now serves instead as a fiscal policy that eventually will hurt the poor and further contribute to poverty.

Acemoglu and Robinson (2012) also relate this sort of resource re-allocation effect to the emphasis by Schumpeter (1934 and 1942) in his description of entrepreneurship as the primary acceleration for economic growth and development through innovation. Schumpeter (1934 and 1942) argues that innovation mainly drives technological, societal, and human progress through creative ideas, which are the catalysts of the never-ending process of creative destruction in which new products from new organization in industry, new technologies, and new activities/methods of production and marketing processes, constantly drive out existing products and technologies. Acemoglu and Robinson (2012) thus argue that replacing the old with the new often results in new sectors attracting resources away from old ones, new firms taking business away from established ones, and new technologies making existing skills and machines obsolete. According to them, such a process of economic growth and the inclusive institutions upon which it is based create losers as well as winners in the political arena and in the economic marketplace.

Despite the positive and significant effect of IQ on poverty, the coefficients of the terms of interaction between growth and IQ are negative and statistically significant at the one percent level in non-regional dummy global sample regressions across the three growth models (columns 1, 3, & 5 of Table 1.2d). This, as expected, reveals evidence that in the global sample, the contribution of EG to extreme PR increases as the quality of institution is increased, irrespective of how growth is measured.

For analysis of marginal interaction effects at different percentile levels of IQ, Table 1.3a reveals that in the non-regional dummy global sample regression models at the \$1.90/day poverty headcount, growth in both WDI per capita GDP and mean income growth reduces extreme PR at all percentile values of IQ, while growth in PWT per capita GDP reduces extreme poverty at a threshold effect size corresponding to 25th percentile level of IQ. For analysis of such marginal growth effect on poverty to be dependent on IQ, the expressions, based on columns 1, 3, & 5 regressions in Table 1.2d, are given by:

$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -3.249 - 2.564\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.889 - 1.139\ (IQ)$
$\frac{\partial(Pov.rt)}{\partial(Meangrt)} = -3.832 - 2.246\ (IQ)$	

Note: *Pov.rt = Rate of poverty; PWTgrt. = PWT Per Capita GDP Growth; WDIgrt. = WDI Per Capita GDP Growth; and Meangrt = Mean income growth*

Where IQ takes different percentile values, and -3.249 for PWT per capita GDP growth, -2.889 for WDI per capita GDP growth, and -3.832 for mean income growth are respectively the conditional effects of each of the three different measures of growth. Also, -2.564, -1.139 and -2.246 are the marginal effects of strengthening IQ for the respective measures of growth. In Table 1.3a, the effect of the terms of interaction between IQ and each of PWT and WDI per capita GDP and PovcalNet mean income growth on extreme poverty are shown to range from -0.840 (25^{th} percentile) to -7.808 (99^{th} percentile) for PWT per capita GDP growth rate, from -1.428 (10^{th} percentile) to -4.914 (99^{th} percentile) for WDI per capita GDP growth, and from -0.952 (10^{th} percentile) to -7.824 (99^{th} percentile) for mean income growth. Such IQ influence on the poverty-reducing effect of growth across the different growth regressions in the non-regional dummy global sample are each due to all of the six IQ dimensions of the World Governance Indicators. See Appendix 4A for details on regression results for each of the six institutional governance indicators.

Similar to the non-regional dummy models in the global sample, Columns 2, 4 & 6 of Table 1.2d reveal a positive and statistically significant effect of IQ on poverty for all three measures of growth in global sample regression models with regional dummies. In addition, the coefficient of the terms of interaction between IQ and the measure of growth is as expected negative and statistically significant for both PWT and WDI per capita GDP growth regressions, but statistically insignificant in the mean income growth regression. In these regional dummy global sample regression models, results for the influence of weighted average IQ on the poverty-reducing effect of both PWT and WDI per capita GDP growth are similar to those obtained for the influence of each of the Six WGI institutional dimensions on the poverty-reducing effects of these two measures of growth presented in Appendix 4A. However, taking a look at similar regression results for regional dummy global sample regressions for mean income growth also presented in Appendix 4A, only the influence of political stability and absence of violence (PSV) dimension on the poverty-reducing effect of mean income growth is negative and statistically significant.

The results as presented in Appendices **1D1** to **1D3** are based on the marginal interaction effect analysis of negative and statistically significant coefficient terms of interaction between IQ and the measures of growth at different percentile levels of IQ (and its dimensions). In Appendix **1D1**, the PWT per capita GDP growth significantly reduces extreme poverty at all percentile levels of IQ (10^{th} to 99^{th} percentile) in EAP and ECA regions, but at threshold effect sizes corresponding to 25^{th} percentile levels of IQ in SA and MENA regions, and at threshold effect sizes corresponding to 50^{th} percentile levels of IQ in the LAC and SSA regions. In Appendix **1D2,** mean income growth significantly reduces extreme poverty at all percentile values of PSV (10^{th} to 99^{th} percentile) in all regions. Also, Appendix **1D3** shows that the WDI per capita growth significantly reduces extreme poverty at all percentile levels of IQ (10^{th} to 99^{th} percentile) in all other regions except in SSA for which it is at a threshold effect size corresponding to the 25^{th} percentile level of IQ.

Table 1.2d: Regression Results on the Effect of Growth on Poverty

Dependent Variable: Δlog \$1.90/day poverty headcount measure, Δloghc_19$_{it}$									
	Global Sample						Sub-Saharan African Sample		
	PWT Growth		WDI Growth		PovcalNet Growth		PWT	WDI	PovcalNet
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Explanatory variables	IV-2SLS	IV-2SLS	OLS	OLS	IV-2SLS	OLS	OLS	OLS	OLS
Growth (in annualised log change)	-3.249***		-2.889***		-3.832***		0.118	-0.00373	-0.990***
	(0.471)		(0.416)		(0.351)		(0.444)	(0.664)	(0.191)
Institutional Quality (sIQ)	0.053**	0.069***	0.0436***	0.0349***	0.050**	0.0334***	-0.0210	-0.0218*	-0.0146*
	(0.026)	(0.025)	(0.0119)	(0.0134)	(0.023)	(0.0103)	(0.0129)	(0.0112)	(0.00796)
Growth*sIQ	-2.564***	-1.992***	-1.139***	-0.982**	-2.246***	-0.261	0.0301	-0.0210	0.226*
	(0.466)	(0.591)	(0.409)	(0.480)	(0.590)	(0.245)	(0.273)	(0.431)	(0.135)
Growth x regional dummy variables									
East Asia and Pacific (EAP)		-3.651***		-3.508***		-3.545***			
		(0.615)		(0.579)		(0.368)			
Europe & Central Asia (ECA)		-2.838***		-3.083***		-3.315***			
		(0.373)		(0.560)		(0.324)			
Latin America & Caribbean (LAC)		-1.660***		-2.332***		-1.908***			
		(0.505)		(0.442)		(0.246)			
Midd. East & North Africa (MENA)		-2.764***		-2.262**		-2.768***			
		(0.844)		(1.092)		(1.023)			
North America (NA)		0.622		0.548		-2.448			
		(2.661)		(1.356)		(1.605)			
South Asia (SA)		-2.723***		-2.489***		-3.818***			
		(0.810)		(0.544)		(0.597)			
Sub-Saharan Africa (SSA)		-2.478***		-1.470**		-1.601***			
		(0.844)		(0.588)		(0.283)			
Change in inequality	2.481***	2.723***	2.493***	2.557***	3.446***	3.577***	1.216***	1.193***	1.324***
	(0.483)	(0.454)	(0.450)	(0.468)	(0.417)	(0.402)	(0.242)	(0.251)	(0.233)
Initial education index	-0.018	-0.067	-0.0849***	-0.0527**	-0.055	-0.0596***	-0.00183	0.00195	-0.0252***
	(0.053)	(0.046)	(0.0206)	(0.0247)	(0.041)	(0.0176)	(0.0133)	(0.0135)	(0.00936)
Constant	0.002	-0.034	-0.0461***	-0.0351**	-0.008	-0.0250**	-0.0588***	-0.0519***	-0.0471***
	(0.033)	(0.027)	(0.0151)	(0.0167)	(0.021)	(0.0127)	(0.0192)	(0.0186)	(0.0145)
Observations	463	463	508	508	498	508	89	91	91
R-squared	0.087	0.227	0.233	0.250	0.303	0.457	0.232	0.221	0.652

Robust standard errors in parentheses; and *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes 1: Regional dummy variables are included in the models in the second, fourth, and sixth columns

Notes 2: PWT = Penn World Tables; WDI = World Development Indicator; Growth = Δlog (Per capita GDP/Mean Income).

Table 1.3a: Impact of the Interaction Between Growth Rates and Level of Institutional Quality on Poverty at different Percentile Levels

At \$1.90/day Poverty Headcount Measure		***Analysis for PWT Per Capita GDP Growth and IQ***	***Analysis for WDI Per Capita GDP Growth and IQ***	***Analysis for Survey Mean Income Growth and IQ***
Percentile	**IQ Percentiles Value**	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -3.249 - 2.564\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.889 - 1.139\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(Meangrt)} = -3.832 - 2.246\ (IQ)$
10^{th}P	-1.282945	0.040	-1.428	-0.952
25^{th}P	-0.9396957	-0.840	-1.819	-1.722
50^{th}P	-0.4090967	-2.200	-2.423	-2.914
75^{th}P	0.6743416	-4.978	-3.657	-5.346
90^{th}P	1.477136	-7.036	-4.571	-7.148
99^{th}P	1.778166	-7.808	-4.914	-7.824
At \$3.20/day Poverty Headcount Measure		***Analysis for PWT Per Capita Growth Rate and IQ***	***Analysis for WDI Per Capita Growth Rate and IQ***	***Analysis for Survey Mean Income Growth Rate and IQ***
Percentile		$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -2.048 - 1.615\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.099 - 0.597\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(Meangrt)} = -2.747 - 1.402\ (IQ)$
10^{th}P	-1.282945	0.024	-1.333	-0.948
25^{th}P	-0.9396957	-0.530	-1.538	-1.430
50^{th}P	-0.4090967	-1.387	-1.855	-2.173
75^{th}P	0.6743416	-3.137	-2.502	-3.692
90^{th}P	1.477136	-4.434	-2.981	-4.818
99^{th}P	1.778166	-4.920	-3.161	-5.240

The 10^{th}P, 25^{th}P, 50^{th}P, 75^{th}P, 90^{th}P, & 99^{th}P values used are obtained from detailed descriptive statistics.

Note: *Pov.rt = Rate of poverty; PWTgrt. = PWT Per Capita GDP Growth; WDIgrt. = WDI Per Capita GDP Growth; and Meangrt = Mean income growth*

For marginal interaction effect analysis of coefficient of the terms of interaction between IQ and measures of growth at different percentile levels of IQ for the dependence of poverty-reducing effect of growth on IQ, the expressions, based on columns 2, 4 & 6 regional dummy regression models in Table 1.2d, are given in Table 1.3b.

Table 1.3b: Effects of the Interaction Between Growth Rates and the Level of IQ on Poverty across Regions at $1.90/day Poverty Headcount Measure

Region	Analysis for PWT Per Capita GDP Growth and IQ	Analysis for WDI Per Capita GDP Growth and IQ	Analysis for Survey Mean Income Growth and PSV
EAP	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -3.651 - 1.992\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -3.508 - 0.982(IQ)$	$\frac{\partial(Pov.rt)}{\partial(Meangrt)} = -3.553 - 0.458(PSV)$
ECA	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -2.838 - 1.992(IQ)$	$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -3.083 - 0.982(IQ)$	$\frac{\partial(Pov.rt)}{\partial(Meangrt)} = -3.313 - 0.458\ (PSV)$
LAC	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -1.66 - 1.992(IQ)$	$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.332 - 0.982(IQ)$	$\frac{\partial(Pov.rt)}{\partial(Meangrt)} = -1.96 - 0.458(PSV)$
MENA	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -2.764 - 1.992\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.262 - 0.982(IQ)$	$\frac{\partial(Pov.rt)}{\partial(Meangrt)} = -2.815 - 0.458\ (PSV)$
SA	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -2.723 - 1.992\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.489 - 0.982(IQ)$	$\frac{\partial(Pov.rt)}{\partial(Meangrt)} = -3.768 - 0.458\ (PSV)$
SSA	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -2.478 - 1.992\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -1.47 - 0.982(IQ)$	$\frac{\partial(Pov.rt)}{\partial(Meangrt)} = -1.406 - 0.458\ (PSV)$

Note: *Pov.rt = Rate of poverty; PWTgrt. = PWT Per Capita GDP Growth; WDIgrt. = WDI Per Capita GDP Growth; and Meangrt = Mean income growth*

Where IQ/PSV takes different percentile values, and like for the PWT results in EAP, -3.651 is the conditional effect of PWT per capita GDP growth, and -1.992 is the marginal effect of strengthening IQ, and so on for other regions and measures of growth.

Thus, in Appendix **1D1**, the effect of the terms of interaction between PWT per capita GDP growth and IQ on extreme PR and the corresponding percentile level of IQ ranges from 1.51 percent (10^{th} percentile) to 6.79 percent (99^{th} percentile) in EAP, from 0.78 percent (10^{th} percentile) to 6.42 percent (99^{th} percentile) in ECA, from 0.56 percent (50^{th} percentile) to 3.72 percent (99^{th} percentile) in LAC, from 0.28 percent (25^{th} percentile) to 4.85 percent (99^{th} percentile) in MENA, from 0.22 percent (25^{th} percentile) to 2.52 percent (99^{th} percentile) in SA, and from 0.59 percent (50^{th} percentile) to 3.79 percent (99^{th} percentile) in SSA.

Also, in Appendix **1D2**, the effects of the terms of interaction between mean income growth and PSV on extreme PR, it ranges from 2.92 percent (10^{th} percentile) to 4.17 percent (99^{th} percentile) in EAP, from 3.00 percent (10^{th} percentile) to 4.06 percent (99^{th} percentile) in ECA, from 1.51 percent (10^{th} percentile) to 2.45 percent (99^{th} percentile) in LAC, from a 2.06 percent (10^{th} percentile) to 3.39 percent (99^{th} percentile) in MENA, from 2.66 percent (10^{th} percentile) to 4.26 percent (99^{th} percentile) in SA, and from 0.63 percent (10^{th} percentile) to 1.93 percent (99^{th} percentile) in SSA.

Similarly, in Appendix **1D3**, the effects of the terms of interaction between WDI growth and IQ on extreme PR ranges from 2.45 percent (10th percentile) to 5.05 percent (99th percentile) in EAP, from 2.07 percent (10th percentile) to 4.85 percent (99th percentile) in ECA, from 1.33 percent (10th percentile) to 3.35 percent (99th percentile) in LAC, from a 0.75 percent (10th percentile) to 3.29 percent (99th percentile) in MENA, from 0.99 percent (10th percentile) to 2.39 percent (99th percentile) in SA, and from 0.09 percent (25th percentile) to 2.12 percent (99th percentile) in SSA.

In summary, the results in columns 1 to 6 of Table 1.2d indicate that the poverty-reducing effect of each of the three measures of growth increases as the quality of institution is improved. As reported in Appendix **1D**, the influence of IQ on the contributions of PWT and WDI per capita GDP growth to extreme PR is observed across all Six WGI dimensions, while similar influence of IQ on the poverty-reducing effect of mean income growth is only observed for political stability and absence of violence dimension.

These findings generally align with the theoretical and empirical perspectives of good and inclusive political and economic institutions that matter for sustained and inclusive EG, efficient allocation and distribution of resources and incomes, political and economic opportunities, increased access to higher human capital accumulation and productive jobs, increased investments and savings for improved development outcomes including PR (Engerman and Sokoloff, 1997, 2002; Ravallion 2001; Alence, 2004; Szirmai, 2005; & 2008; Acemoglu and Robinson, 2012; Bluhm and Szirmai, 2012; Perkins et al., 2013; Nissanke, 2015; Goldin, 2016; ACBF[1], 2017; Coppock and Mateer, 2018; Larrain, 2020; Torvik, 2020; and Fosu, 2022). It is also in line with the institutional theoretical framework by Zhuang et al. (2010) that captures dimensions of luster of mutually reinforcing market and growth-enhancing formal institutions including accountability, rule of law, political stability, bureaucratic capability, property rights protection and contract enforcement, and control of corruption. The theoretical hypothesis by Zhuang et al. (2010) a society that effectively establish such a cluster of formal political and economic institutions would have less costs in market transactions, be able to control the state, support private sector initiatives or market exchanges and investments, and hence achieve economic development. The findings also support efficient market-enhancing governance theoretical framework by Khan (2007) who identified stable property rights as critical governance capabilities for efficient transaction costs of buyers and sellers, ensuring low corruption, efficient and low-cost

[1] *ACBF=African Capacity Building Foundation, AfDB=African Development Bank, and ADB=Asian Development Bank*

contracting and dispute resolution in line with a good legal and judiciary system, efficient delivery of public goods and services in accountable and transparent manners, and maximize attraction of capital and new/advanced technologies, and hence improved growth and development. The results also align with inclusive growth frameworks by others (ADB, 2011; AfDB, 2012; and Cerra, 2022). These sources argue that high institutional quality and good governance (political and economic governance) environment motivate inclusive growth that allows people including the poor to participate in, and benefits from the growth process. This, according to the sources, can be achieved through increased access to sufficient economic opportunities (and productive jobs), and the relative equal rights and access to basic services, as well as empowerment in social and political life.

For the analysis of SSA sample regression models, columns 7 to 9 of Table 1.2d show that only the mean income growth elasticity of poverty that is negative and statistically significant at the one percent level. In this case, a one percent increase in mean income reduces poverty by 0.99 percent. This difference in results obtained from the SSA regression models may be due to the limited sample observations in the region compared with the global sample. Also, in the same SSA sample, it can be seen that the effect of the level of IQ on extreme poverty is, as expected, negative across all measures of growth, and statistically significant for both WDI per capita GDP and mean income growth regressions. Indeed, columns 8 & 9 of Table 1.2d show that a one percent increase in the level of IQ reduces extreme poverty by 0.02 percent in the SSA sample models for both WDI per capita GDP and mean income growth. The results are in line with findings from other studies, showing that IQ contributes significantly to PR (Chong and Caldero´n, 2000b; Tebaldi & Mohan, 2010; Perera & Lee, 2013; Asongu and Kodila-Tedika, 2014; Cepparulo et al., 2017; and Fagbemi et al., 2020). However, there is no significant evidence of poverty-reducing effect of the terms of interaction between IQ and any of the measures of growth in the SSA region. This may likely be due to the relatively limited sample observations included in the analysis for the region.

For control variables, results across all columns of Table 1.2d reveal that the effect of income inequality on poverty is positive and statistically significant. This shows evidence of its contribution to the increase in poverty, and its potential to diminish the impact of EG on PR. Such findings agree with those from other studies (Ravallion, 1995; Ncube et al., 2015; Bicaba et al., 2015; Sembene, 2015; Adeleye et al., 2020) who identify increased income inequality as a barrier to the contribution of EG to PR. Moreover, in these same columns of the same table, human capital measured in terms of initial level of education index (the average of the indices of early and mean years of schooling) also has negative and statistically significant effect on poverty across models for three measures of growth at $1.90/day poverty headcount.

At $3.20/day poverty headcount, Appendix **1B2** presents regression results for both global and SSA samples. Despite the slight differences in magnitudes of the coefficients, results are generally similar to those obtained at $1.90/day poverty headcount, except for the significance of two coefficients that are observed to be different.

First, column 2 of Appendix **1B2** shows that the coefficient of PWT per capita GDP growth in SSA in the regional dummy global sample regression model is negative and statistically insignificant. Second, in contrast to the result at $1.90/day poverty headcount, column 4 of Appendix **1B2** reveals a negative and statistically insignificant coefficient of the term of interaction between IQ and WDI per capita GDP growth in the regional dummy global sample regression at the $3.20/day poverty headcount. However, the results are similar to those obtained in the regional dummy global sample regression models for mean income growth, where the coefficient of the term of interaction between mean income growth and the weighted average of IQ is statistically insignificant, but negative and statistically significant for the political stability and absence of violence (PSV) dimension of IQ. As revealed in Appendices **1D1** to **1D2**, it can be seen that the mean income and WDI per capita GDP growth significantly reduce poverty at all percentile levels of PSV in all regions.

Apart from some small differences, results obtained from analysis of SSA cross-country sample regressions at the $3.20/day poverty headcount, as shown in Appendix **1B2**, are broadly similar to those at the $1.90/day poverty headcount presented in Table 1.2d across models for the different measures of growth.

2.4.3.3 Robustness Test Regression Results and Discussions: The Bourguignon Model

With the Bourguignon model, columns 1, 3, & 5 of Table 1.4 show that in the global sample regression models with non-regional dummies, the per capita growth elasticity of poverty is positive across models of the three measures of growth at $1.90/day poverty headcount. In fact, columns 1 and 5 of the table reveal that the effects of PWT per capita growth rates and mean income growth on poverty are both positive and statistically significant. In the global sample regression models with regional dummies, columns 2, 4, & 6 of Table 1.4 show no statistically significant evidence of the effect of per capita or mean income growth on poverty in any of the geographical regions at the $1.90/day poverty headcount across the three measured growth models compared in this study. Similar results are seen in the SSA cross-country sample regression models for the effect of per capita growth on extreme poverty across models of the three measures of growth, even when the PWT and WDI per capita growth elasticities of poverty are each negative, while the mean income growth elasticity of poverty is positive and statistically significant (see columns 7 to 9 of Table 1.4). These results contradict findings from other studies (Kalwij and Verschoor, 2007; Lombardo, 2010; and Fosu, 2015, 2017 & 2018) who used the Bourguignon model and found significant effect of growth on PR.

Table 1.4 also reveals that the coefficients of IQ in global sample regression models with and without regional dummies are positive across the different growth regression models and are statistically significant in the PWT per capita and mean income growth regression models as shown in columns 1, 3, & 5. Moreover, while the coefficient of the term of interaction between IQ and per capita income growth is negative across models of the different measures of growth, only in the PWT per capita growth regression model (column 1 of Table 1.4) that such coefficient is also statistically significant. This, as expected, shows that in the global sample, the contribution of per capita income growth seems to depend on the level of IQ in the PWT growth regression model.

Table 1.5 presents analysis of the partial/marginal effect of the term of interaction between IQ and per capita growth rate at different percentile levels of IQ. The table reveals that despite the negative and significant coefficient of the interaction term, the PWT per capita growth rate has no statistically significant evidence of reducing extreme poverty at any level of IQ in this model. Despite the negative and significant effect of the term of interaction, evidence on such influence of IQ on the effect of PWT per capita growth rates on poverty is largely due to the political stability and absence of violence dimension of IQ at $1.90/day poverty headcount, which is clearly shown to be an inadequate moderator in the Bourguignon model.

Also, Table 1.4 (columns 7, 8, & 9) presents regression results in the SSA cross-country sample. While the level of IQ only significantly reduces the rate of extreme poverty by 0.03 percent in the WDI growth regression model (see column 8), there is no statistically significant evidence of the effect of the term of interaction between IQ and per capita growth on PR across models of the three measures of growth in the SSA region at the $1.90/day poverty headcount.

In contrast with findings obtained from the standard model regression analysis regarding Gini income inequality, Table 1.4 (columns 1 to 6) reveals that the coefficient of the growth rate of income inequality is negative and statistically insignificant across models of the three measures of growth in the global sample. As seen in columns 7, 8, & 9 of Table 1.4, similar results are obtained in the SSA cross-country sample regression models across the different measures of growth employed in this study. The results also contradict findings from other Bourguignon model empirical studies (Bourguignon, 2003; Kalwij and Verschoor, 2007; Fosu, 2015, 2017 & 2018), as well as other standard model related studies (Ravallion, 1995; Ncube et al., 2015; Bicaba et al., 2015; Sembene, 2015; Adeleye et al., 2020) who found that the poverty elasticity of income inequality is positive and statistically significant. Hence show evidence of income inequality contributions to poverty.

The dependence of growth elasticity of poverty on the initial level of income inequality and on the level of development or location of the poverty line in the Bourguignon model means that the coefficients on both the changes in per capita (or mean) income growth and changes in income inequality are no longer net elasticities as in the case of the Standard model specification. Rather, the independent terms of these factors and the respective terms of interactions with changes in per capita (or mean) income and in income inequality are also found to influence these elasticities of poverty in a non-linear manner. In fact, sources argue that the two factors tend to correct downward the estimates of both the mean income or per capita growth and income inequality elasticities of poverty (Klasen and Misselhorn, 2008; and Lombardo, 2010). Besides, the inclusion of these independent factors and the respective terms of interaction with other variables without addressing potential endogeneity for interaction terms containing growth would tend to biase the poverty-reducing effects of growth and its term of interaction with IQ in the Bourguignon model. This might intuitively be the reasons for the insignificant effects of the independent per capita or mean income growth and its terms of interaction with IQ on PR. Thus, further studies should therefore employ instrumental variables estimation that address the potential endogeneity of the model and endogenous growth terms including those associated with the introduced factor terms containing measures of growth. Such estimation techniques should appropriately employ 2SLS and/or other empirical methodology such as System GMM following the step-by-step suggestions by Bazzi and Clemens (2013) and Kraay (2015).

Indeed, these terms, like the rate of change of income inequality, display results of mixed effects on poverty as revealed in Table 1.4. The coefficients of other income inequality associated terms of interaction are seen to be negative or positive and, in some cases, statistically significant in the global sample. These can be seen across all columns in Table 1.4. The coefficients of the terms of interaction between the change in income inequality and its initial level (dGini*lnsGini) and between the change in income inequality and the location of poverty line at $1.90/day poverty headcount (dGini*lnZY19) are negative across the three measures of growth regression models. The coefficients of the two terms of interaction are both negative and statistically significant in the mean income growth regressions (columns 5 & 6 of Table 1.4), and thus indicate evidence of their significant effects on PR. However, while the coefficients of these two interaction terms are not significant in the WDI per capita growth regression model, the coefficient of dGini*lnZY19 shown in columns 1 & 2 of Table 1.4 in PWT per capita growth regression model is negative and statistically significant, and hence poverty at the 10% level.

Similarly, the coefficients of the terms of interaction between change per capita growth with the location of poverty line at $1.90/day poverty headcount (Growth*lnZY19) are positive and statistically significant across the different measures of growth regression models. Hence it contributes to poverty. Like the rate of change in Gini income inequality, these interaction terms also contribute to dampening the response of poverty to growth. This is consistent with literature (Bourguignon, 2003; Kalwij and Verschoor, 2007; and Fosu, 2015, 2017&2018) arguing that the absolute value of both mean/per capita income growth elasticity of poverty and the elasticity of income inequality independently decreases significantly with initial Gini and with the ratio of poverty line to the measure of growth.

Furthermore, the current study Bourguignon model regression results for the effect of the level of initial human capital on PR as revealed in Table 1.4 (columns 1 to 6) are similar to those obtained from the main standard model analyses previously discussed, where the coefficients are negative and statistically significant.

At $3.20/day poverty headcount, columns 1 to 6 of Appendix **1C** reveal that in the global sample, findings are similar to those obtained at $1.90/day poverty headcount for all other variables except for the rate of change of income inequality. The coefficient of the rate of change of income inequality is found to not only be negative, but also statistically significant at the one percent level in both PWT and WDI growth regression models (columns 1 to 6 of Appendix 1C) in the global sample. This is also the case for results from regression models in the SSA sample at $3.20/day poverty line for the same PWT and WDI per capita growth regression models. The results also contradict findings from other Bourguignon model empirical studies (Bourguignon, 2003; Kalwij and Verschoor, 2007; Fosu, 2015, 2017 & 2018), as well as other standard model empirical studies (Ravallion, 1995; Ncube et al., 2015; Bicaba et al., 2015; Sembene, 2015; Adeleye et al., 2020) who finds that the poverty elasticity of income inequality is positive and statistically significant. Nevertheless, such findings show that the correlation and impact/effect relationship of income inequality with poverty is empirically fragile, as it can be positive or negative, depending on the estimation techniques and econometric models employed.

Notwithstanding, in the SSA ample, columns 7, 8, & 9 of Appendix **1C** reveal that the coefficient of the term of interaction between the change in Gini and the location of poverty line at \$3.20/day poverty headcount (dGini*lnZY32) is negative and statistically significant across the three-growth data. This is not the case at \$1.90/day poverty headcount, where similar coefficient is only statistically significant in the mean income growth regression models for the SSA cross-country sample.

Table 1.4: Robustness Test Regression Results for Bourguignon Model

Dependent Variable: Δlog \$1.90/day poverty headcount measure, $\Delta loghc\_19_{it}$									
	Global Sample						Sub-Saharan African Sample		
	PWT Growth Dataset		WDI Growth Dataset		PovcalNet Growth		PWT	WDI	PovcalNet
Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Growth	3.981*		4.301		1.291**		-0.756	-0.502	1.635***
	(2.307)		(3.385)		(0.640)		(1.023)	(2.077)	(0.520)
Institutional Quality (sIQ)	0.0435***	0.0357**	0.0228	0.0220	0.0360***	0.0357***	-0.0210	-0.0281*	-0.00641
	(0.0152)	(0.0155)	(0.0165)	(0.0168)	(0.0126)	(0.0128)	(0.0152)	(0.0147)	(0.00666)
Growth*sIQ	-0.627*	-0.510	-0.417	-0.669	0.0824	-0.0357	-0.0149	0.0820	0.245**
	(0.349)	(0.318)	(0.637)	(0.632)	(0.307)	(0.335)	(0.277)	(0.419)	(0.117)
Growth x regional dummy variables									
East Asia and Pacific (EAP)		1.389		1.765		-0.470			
		(2.591)		(4.054)		(1.253)			
Europe & Central Asia (ECA)		2.028		2.579		0.0462			
		(2.781)		(4.237)		(1.351)			
Latin America & Caribbean (LAC)		2.885		1.973		0.416			
		(2.400)		(3.872)		(1.037)			
Middle East & North Africa (MENA)		2.970		3.249		0.426			
		(2.691)		(4.245)		(1.499)			
North America (NA)		4.509		5.537		0.767			
		(2.830)		(4.337)		(1.930)			
South Asia (SA)		2.364		2.912		-0.844			
		(2.589)		(3.993)		(1.252)			
Sub-Saharan Africa (SSA)		2.916		3.358		0.753			
		(2.356)		(3.737)		(0.969)			
Change in inequality (dGini)	-3.898	-4.042	-1.763	-1.940	-1.498	-1.410	-3.172	-2.041	-0.505
	(3.089)	(3.124)	(2.811)	(2.889)	(1.768)	(1.851)	(3.538)	(3.084)	(0.696)
Initial inequality (lnsGini)	0.0427	0.0367	0.0420	0.0378	0.0151	0.0173	0.0803	0.0676	0.0164
	(0.0385)	(0.0388)	(0.0448)	(0.0447)	(0.0269)	(0.0272)	(0.0517)	(0.0606)	(0.0280)
Growth*lnsGini	1.222	0.177	1.293	1.909	3.254***	2.324**	-0.0780	0.0865	2.278***
	(0.868)	(1.243)	(1.598)	(2.019)	(0.628)	(1.089)	(0.566)	(1.171)	(0.584)
dGini*lnsGini	-2.056	-1.731	-3.176	-3.556	-3.647*	-3.619*	-2.285	-2.182	-1.179
	(2.343)	(2.440)	(2.448)	(2.539)	(1.886)	(2.017)	(2.154)	(2.179)	(0.711)
Level of development (lnZY19)	-0.0195	-0.0182	-0.0235*	-0.0194	0.000565	0.00363	0.0122	0.00665	0.00387
	(0.0135)	(0.0132)	(0.0120)	(0.0120)	(0.0122)	(0.0124)	(0.00858)	(0.00952)	(0.0105)
Growth*lnZY19	0.536**	0.457*	0.699**	0.407	0.561**	0.417	-0.100	-0.105	1.280***
	(0.232)	(0.236)	(0.349)	(0.393)	(0.264)	(0.355)	(0.126)	(0.253)	(0.234)
dGini*lnZY19	-0.562*	-0.619*	-0.197	-0.175	-1.205***	-1.149***	-0.357	-0.242	-1.416***
	(0.322)	(0.334)	(0.317)	(0.337)	(0.438)	(0.442)	(0.282)	(0.220)	(0.404)
Initial education index	-0.0778***	-0.0609**	-0.0806***	-0.0636**	-0.0447**	-0.0358*	0.00839	0.00737	0.00939
	(0.0291)	(0.0304)	(0.0266)	(0.0305)	(0.0190)	(0.0191)	(0.0176)	(0.0190)	(0.00663)
Constant	-0.183	-0.169	-0.205*	-0.169	0.000697	0.0123	0.107	0.0457	0.0195
	(0.131)	(0.128)	(0.107)	(0.107)	(0.0377)	(0.0383)	(0.0832)	(0.0883)	(0.0224)
Observations	471	471	508	508	508	508	89	91	91
R-squared	0.261	0.282	0.252	0.264	0.471	0.479	0.326	0.282	0.860

*Robust standard errors in parentheses and (*** p<0.01, ** p<0.05, * p<0.1)*

Notes 1: *Regional dummy variables are included in the models in the second, fourth, and sixth columns*

Notes 2: *PWT = Penn World Tables; WDI = World Development Indicator; Growth = Δlog (Per capita GDP/Mean Income)*

Table 1.5: Impact of Interaction Terms for Growth Rates and Level of Institutional Quality in the Bourguignon Model on Poverty at different Percentile Levels

At $1.90 poverty line	***Percentile values***	***Analysis for PWT Per Capita Growth Rate and IQ***
Percentile	***Percentile values for IQ***	$\frac{\partial(Pov.rt)}{\partial(PWT.vagrt)} = 3.981 - 0.627\ (IQ)$
10thP	-1.282945	**4.785**
25thP	-0.9396957	**4.570**
50thP	-0.4090967	**4.238**
75thP	0.6743416	**3.558**
90thP	1.477136	**3.055**
99thP	1.778166	**2.866**

2.5 Conclusion and Policy Implications

Previous and ongoing debate in literature on the fight against poverty as a major development goal has consistently focused on the responsiveness of poverty to growth and income inequality across the world, especially in developing countries and regions.

Despite the overwhelming support to the importance of EG as the primary driver for PR, there still remains inconclusive evidence, as others argue that EG alone is insufficient for rapid and sustained PR in developing countries. This is the case for SSA, where the remarkable EG over the last two-three decades has not been effective for PR in the region. According to reviews, this is because increased income does not automatically translate into rapid PR and improved quality of life but rather depends on factors that affect progress of EG and its effect on PR. As identified in literature, such factors include the differences in measures of EG originating from different sources, changes in income inequality, increased population growth rate swollen by working age and youth populations with limited capacity, limited resource capacity (human skills, financial access, and material/infrastructure) and the model specifications and estimation methods used in determining the effect size. Among others, the quality of policy and institutional environments, especially the quality of governance, policy, and institutional environments remain important factors in literature for growth effect on PR. However, none of the studies have used the same robust estimation methods to compare the effects across different measures of EG and across the commonly used income inequality related Standard and Bourguignon model specifications. Also, theories and development policy frameworks have claimed that high IQ influences the translation of EG into reductions in income poverty and inequality. Nevertheless, no robust empirical study has employed in the model, the direct introduction of the terms of interaction between IQ and different measures of EG for the moderating influence of IQ on the effect of EG on income PR, particularly in SSA.

This study therefore investigates the comparative effects of three measures of EG (Penn World Table - PWT and World Development Indicator – WDI GDP per capita growth, and mean income growth) on income PR and the moderating influence of IQ on the income poverty-reducing effect of EG at global level and in SSA relative to other regions. It employs Pooled OLS and 2SLS estimations on data from different sources for the period 1990-2020.

Findings reveal that the effect of each of the three measures of EG on poverty is negative and statistically significant at global level and across regions including SSA. This contrast findings by Adams (2004), which to the knowledge of this thesis author is the only previous but unrobust study that compared the effects of two measures of EG on poverty. In that study, Adams found a negative and statistically significant effect of mean income growth on poverty but a negative and insignificant effect of WDI GDP per capita growth on poverty. Thus, while Adams (2004) argues that the poverty-reducing effect of growth depends on the measure of growth, this study rather demonstrates that the effect of growth on poverty largely depends on the estimation methods employed and the quality of institutional environment.

Despite accounting for income inequality across the different growth models in this study, the growth elasticities of poverty observed across regression models are relatively larger at global and regional levels, compared with those obtained in literature. Even the least growth elasticities of poverty observed in SSA across growth regression models are relatively larger in size than those found in literature (Kalwij and Verschoor, 2007; and Fosu, 2017). This might be associated with the presence of IQ terms in the models, revealing the possibility of such meaningful growth effects on PR. Such observation is consistent with the work of Khan (2011) on good governance and distribution, arguing that good governance reforms are highly likely to improve income distribution in poor countries, even in cases where good governance reforms may have an anomalous effect on growth. Thus, since income distribution, poverty, and growth are arithmetically related, an increased growth with increased income distribution would consequently cause the increased impact of growth on poverty reduction.

Indeed, while the level of IQ independently tends to contribute to poverty, the effect of the term of interaction between it and each of the measures of per capita growth on poverty is negative and statistically significant at global level and across regions including SSA. In fact, results from the regional dummy global sample regressions show that each of the PWT and WDI GDP per capita growth has a slightly larger effect size on extreme poverty than the survey mean income growth in high institutional quality environment in SSA. Thus, while there are scarce or no robust empirical studies that utilises the terms of interaction between IQ and EG directly in the model specifications to examine the moderating effect of IQ on the income poverty-reducing effect of EG, this study provides evidence as a contribution to literature. It demonstrates through standard model regressions, that the income poverty-reducing effect of different measures of EG significantly depends on the level of IQ and its dimensions with larger effect size of EG on PR in a high IQ environment at global level and across regions including SSA.

However, this study argues that having the independent effect of IQ to be positive and statistically significant while the effect of the term of interaction is negative and statistically significant, means that increased institutional quality intuitively tends to be poverty-reducing in the long-run rather than in the short-run. This is consistent with the Kuznets's (1955) theoretical hypothesis on the relationship between economic inequality and the level of development measured in GDP per capita growth. According to this hypothesis, in the process of economic development, inequality increases at the initial stage while GDP per capita growth is increased but only benefits a small segment of the population at that stage. However, in the long-run, while growth increases, the inequality subsequently declines as larger proportion of the population gain employment in the high-income sector. Khan (2007) and Acemoglu and Robinson (2012) purport this to have direct association with the quality of institutional environment, that effective institutional reforms usually come along with eminent changes. These may be technological change, establishment of new innovative firms, new service delivery mechanisms, new activities/methods of production, and increased demand for institutional infrastructure and skilled and technical capabilities that often reduce the need for old ones. In developing countries with limited fiscal resources, critically important resource re-allocations would be required where new sectors attract resources away from old or existing ones, new firms take business away from established ones, and new technologies make existing skills and machines obsolete just to match with such early-stage development drive. These initially result in a reduction in employment in formal and informal sectors and thus in income, leading to increased income inequality, and eventually to increased poverty. However, when the new establishment and rapid growth are set in, more people will then be employed in higher income sectors thereby increasing income and income distribution, hence increased PR.

For control variables, results reveal that the coefficient of the growth rate of income inequality is positive and statistically significant across regression models for the three measures of growth. This, in line with previous studies, shows evidence of increased contribution of income inequality to poverty, and as such, diminishes the impact of per capita growth rate on PR if not addressed. Furthermore, the study finds that human capital measured in terms of initial level of education index (the average of the indices of early and mean years of schooling) has statistically significant effect on extreme PR across the three measures of growth. While important for PR, it also proved to enhance the significant contribution of EG to PR.

Thus, while other literature argues that EG matters but also insufficient for rapid PR, this study clearly reveals that an effective and high IQ environment enhances the rapid poverty-reducing effect of growth in developing countries including those in SSA. This means that governments and policy makers in low- and middle-income developing countries including those in SSA should prioritize reforms that strengthen or create mutually reinforcing high quality and inclusive political and economic institutional environment within the efficient market- and growth-enhancing governance framework that support sustained and inclusive economic development. Such clustered/integrated institutional reforms should strengthen regulatory and legal systems that ensure contract enforcement and property rights, control of corruption, minimal barriers to doing business, and financial stability with less inflation and increased access to finance. The efforts should also give due consideration to improvement in skilled human capital development. These may include government and private investments and other development interventions in improved literacy level and level of quality education (especially among the female and youth), vocational and on-the-job training skills development, and improved healthcare services and food and nutrition intake.

The reform systems should be resilient to fragility in the form of conflict, divided societies, deficient political leadership, missing systems of checks and balances, thereby making the states to be accountable for delivery sustainable growth and enhancing their capacity to design for the delivery. These thus attract public and private investments in sectoral activities including development of human and infrastructure and technological capacity for efficient workforce and accountable and transparent delivery of public goods and services, maximize attraction of capital and new/advanced technologies, and hence long-run growth with increased participation of actors in the process for rapid PR.

For the reforms to have transformative impacts on the poor populations, they should align with underline factors needed for structural transformation that make growth more inclusive. This would require an effective and inclusive political class necessary for establishing the mechanisms for equity, stability, improved growth and PR as well as keeping politicians accountable to their citizens. It would also require optimal design of innovative social protection/assistance and social insurance programmes with focused policies on economic and social mobility that effectively provide production support to the poor populations. Such programmes might include removing the barriers that prevent productive individuals from accessing higher-earning jobs by increasing the productivity of the firms that employ them, raising the skills of the poor to make them more productive and facilitating their transition into more productive sectors, and encouraging trading partners whose gains are shared more widely.

Such diverse interventions accounting for different sets of groups requires an integrated framework that reflects distinctive sustainable and inclusive development features. For instance, it should reflect the characteristics of institutional theoretical framework by Zhuang et al. (2010), which argue that society should effectively establish a cluster of formal political and economic institutions with less costs in market transactions, that control the state and support private sector initiatives and investments for improved economic development. It should also reflect the features of efficient market- enhancing and adaptable growth-enhancing governance theoretical framework by Khan (2007), which require critical governance capabilities for efficient transaction costs, ensuring low corruption, efficient and low-cost contracting and good legal and judiciary system for dispute resolutions, efficient and accountable delivery of public goods and services, and maximising attraction of capital and new/advanced technologies. Moreover, it should have features of inclusive growth frameworks by Asian Development Bank (2011), African Development Bank (2012), and Cerra (2022). These frameworks are anchored on strong and high quality inclusive political and economic institutional environment that promote prosperity, allow talent and innovative/creative ideas to be rewarded, foster economic cooperation, remove economic and political uncertainties, enhances the participation of people including the poor in growth process through sufficient economic opportunities and the relative equal rights and access to basic services and empowerment in social and political life, and encourage the selection of political leaders not just at the top but across government organizations based on the identities that positively affect economic policy and how they can be held accountable for their actions.

While this study clearly reveals the importance of high IQ environment for increased poverty-reducing effect of EG, it recommends future studies to focus on exploring the types of policies and IQ dimensions that can influence reduction in income inequality as well as improvement in both human capital and sustained EG, and their corresponding translations into rapid PR. The study also calls for future research, using the same estimation methods employed here, to consider the inclusion of poverty measures, such as poverty gap (intensity of poverty) and squared poverty gap (severity of poverty), as well as urban and rural poverty as dependent variables for more nuance analysis.

Furthermore, the study finds contrasting results from robustness test regressions using the Bourguignon model specification, showing no significant effect of the three measures of growth and their respective terms of interaction with IQ on poverty at global level and across regions. In fact, the effects of PWT GDP per capita and mean income growth are positive and statistically significant in the global sample. Also, findings from this robustness regression models reveal that the coefficient of the growth rate of income inequality is negative and in fact statistically significant at moderate/middle income poverty headcount across the three measures of growth. As observed, the dependence of growth elasticity of poverty on the initial level of income inequality and on the level of development or location of the poverty line in the Bourguignon model means that the coefficients on both the changes in per capita (or mean) income growth and changes in income inequality are no longer net elasticities as in the case of the Standard model specification. Rather, and in line with other (Klasen and Misselhorn, 2008; and Lombardo, 2010), the independent terms of these factors and the respective terms of interactions with changes in per capita (or mean) income and in income inequality are also found to influence these elasticities of poverty in a non-linear manner.

Such results contradict findings from studies in literature including previous Bourguignon model related empirical studies, showing that the poverty elasticity of income inequality is positive and statistically significant. The mixed findings show that the correlation and impact/effect relationship of income inequality with poverty is empirically undecided, as it can be positive or negative, depending on the model specifications and estimation techniques employed. This, in line with Bergstrom (2020), means that policy makers should understand the mechanisms through which changes in growth and inequality affect each other, and in which ways both affect poverty. Thus, developing countries including those in SSA, are required to engage in reforms of policies and institutional environment that promote income-enhancement and inequality-reduction (with positive or little effects of inequality on EG) while also encourage increased participation of the poor (including women and the youth) in the process and benefits of EG. Such reforms may include social safety nets with conditional cash transfers for engagement in viable economic activities or technical capacity building that attract investments. It may also be aid and government support to investment into private sector development and conditional public-private partnerships in viable economic activities.

CHAPTER THREE: INSTITUTIONS, AND THE SECTORAL PATTERNS OF ECONOMIC GROWTH FOR POVERTY REDUCTION: GLOBAL EMPIRICAL EVIDENCE WITH FOCUS ON SUB-SAHARAN AFRICA

Abstract

This study investigates the effects of sectoral compositions of growth and structural transformation on PR and the extent to which Institutional Quality (IQ) influences the poverty-reducing effect of these growth compositions on PR at the global level and in Sub-Saharan Africa (SSA) relative to other regions. It employs Pooled OLS and 2SLS estimations on data for the period 1990-2018. For non-IQ model, findings show that services and agriculture value-added and labour productivity growth (LPG), as well as structural change and sector productivity growth have statistically significant poverty-reducing effects at global level. However, manufacturing/industry value-added and LPG have insignificant poverty-reducing effects at global level. Across regions, services value-added and LPG have statistically significant poverty-reducing effects in East Asia and Pacific, South Asia, and SSA. Agriculture value-added growth has statistically significant poverty-reducing effects in Europe and Central Asia, Latin America and Caribbean, and Middle East and North Africa. However, manufacturing/industry value-added and LPG as well as Agriculture LPG have insignificant poverty-reducing effects across regions including SSA. For models with IQ terms at global level, findings show that IQ, through interaction, significantly enhances the poverty-reducing effects of services and agriculture value-added growth, while it significantly enhances moderate poverty-reducing effect of industry value-added growth. Regulatory Quality (RQ) and Government Effectiveness (GE) significantly enhance the poverty-reducing effect of agriculture LPG at critical threshold. Across regions, IQ significantly enhances the poverty-reducing effects of services value-added growth in South Asia and SSA. RQ and Control of Corruption (CC) significantly enhance the poverty-reducing effect of services LPG at all levels of RQ and CC in South Asia, but at critical thresholds in other regions including SSA. Also, Voice and Accountability (VA) significantly enhances the poverty-reducing effect of agriculture value-added growth, while VA and Rule of Law (RL) significantly enhance poverty-reducing effects of industry value-added at critical thresholds across regions including SSA. However, only VA significantly enhances the poverty-reducing effect of structural change in EAP and at critical thresholds in other regions including SSA.

3.1 Introduction and Background of the Study

Empirical literature[2] on the poverty-reducing effect of growth, based on the theories of single-sector neoclassical growth model (Solow, 1956; Lucas, 1988; Romer, 1986, 1990; and Grossman and Helpman, 1991) show that economic growth (EG) tends to reduce poverty. Despite giving less attention to the production and allocation of resources across the sectoral sources of economic activities such as agriculture, industry, and services, the literature also argues that the extent to which growth reduces poverty may vary across these sectors.

Indeed, country and cross-country studies on the effects of sectoral EG on poverty have revealed evidence of relatively high significant contribution of the agriculture sector value-added growth to poverty reduction (PR) than value-added growth originating in the non-agriculture sectors (Ravallion and Datt, 1996; Diao et al., 2007 & 2010; Montalvo and Ravallion, 2010; Ferreira et al., 2010; de Janvry and Sadoulet, 2010; Christiaensen et al., 2011; and Chuhan-Pole et al., 2014;). Other studies examining the linkages between measures of labour productivity growth (LPG) and poverty revealed that the dimensions of LPG substantially contribute to PR (Datt and Ravallion, 1998; Loayza and Raddatz, 2010; Imai et al., 2017; Ogundipe et al., 2017; Hamit-Haggar and Souare, 2018; and Imai et al., 2019).

Several empirical studies (Naiya, 2013; Hasan et al., 2015; Page and Shimeles, 2015; Imai et al., 2017; Gupta and Gupta, 2020; Rifa'i and Listiono, 2021; and Benfica, and Henderson, 2021) have emphasised the importance of labour productivity for sustained EG and PR. These studies examined the poverty-reducing effect of the components of LPG in terms of changes due to the reallocation of labour across sectors and within-sector productivity growth. While some of the studies have accounted for analysis at and between rural (agriculture) and urban (non-agriculture) sector locations, overall findings confirmed both agriculture and non-agriculture sectors as important channels through which EG contributes to PR, regardless of the variation across countries and regions.

Furthermore, other empirical studies have focused on analysis of theoretical and historical literature (Lewis, 1954; Fei and Ranis, 1964; and Chenery et al., 1986) for the discussion of pathways through which economic transformation contributes to increased LPG, namely structural change, and sector productivity growth, and to understand the ongoing rapid EG in Africa. These empirical studies generally find that many African countries are going

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[2] *See for instance studies by Ravallion and Chen (1997), Roemer and Gugerty (1997) Dollar and Kraay (2002) Adams (2004) Kalwij & Verschoor (2007) and Fosu (2015 & 2017).*

through deindustrialization compared to the historical patterns of economic transformation in Europe, Asia, and North America (Mcmillan & Rdrik, 2011; De Vries et al., 2015; Fox et al, 2017; Diao et al., 2019; and McMillan and Zeufack, 2022). Hence limiting the region's capacity to generate productive quality jobs and rapid & sustained EG for improved PR.

Key among the summary of gaps/constraints identified in the above literature is the low agricultural LPG and its insignificant contribution to PR relative to the services and manufacturing sectors in Sub-Saharan Africa (SSA). The other is the lack of rapid structural change and its limited contribution to average LPG, causing premature de-industrialization in SSA. In addition, the structural transformation in SSA is dominated by vulnerable employment in the low-productivity informal services sector that has limited potential for international markets. Also, the extractive primary natural resources in SSA are largely undiversified due to the limited exploitation to promote economic diversification in the commodity-driven growth sectors, resulting in a stagnated share of the labour force in the high-productivity manufacturing sector. Furthermore, there is limited public and private sector investment efforts, especially towards private sector development interventions to typically boost sectoral productivity and output for improved PR. Above all, sources argue that the poverty-reducing effect of EG in SSA is dampened by increased growth rate of population and the rising levels of inequality in income and access to social infrastructure and services (Ravallion and Chen, 2007; Christiaensen et al., 2011; Chuhan-Pole, P., 2014; Filmer & Fox, 2014; and Thorbecke, 2014).

For instance, Chuhan-Pole (2014) and Filmer and Fox (2014) emphasised that SSA had the highest total fertility rate of 5.1 total births per women in 2012 in the world and more than twice as high as that of South Asia. This has contributed to the swollen population of youth to about half of the population below 25 years of age in the region. It has also muted improvement in livelihoods as evidenced by an average annual per capita income growth rate of 1.8 percent, relative to the average annual real output growth rate of 4.5 percent in the region, and in the rest of the developing world over the same period. Also, three-quarters of the population concentrated in the rural areas in the region, especially in low-income countries primarily rely on the low productive agricultural and informal services sectors for their livelihoods. Moreover, Thorbecke (2014) and the African Capacity Building Foundation (ACBF) (2017) argued that over the rapid growth period, SSA accounts for significant proportion of most unequal countries in the the world, due to endemic inequality that is limiting the benefit of growth from reaching the poor. Indeed, recent estimates show that there are 16 billionaires in SSA, along with about 358 million people living in extreme poverty with seven out of every 10 people in SSA living in countries where inequality is growing fast (ACBF, 2017; and Milanovic, 2009).

The literature reviewed in this study generally recommends appropriate and effective policy and institutional environment for addressing the prevailing gaps/constraints. This is indeed necessary for SSA as Foresight Africa (2020) have emphasised the lack of institutional policy and governance environment to effectively facilitate public and private sector economic and social activities in many African countries. Despite these recommendations, **no** rigorous empirical study has been done, especially in SSA that examines the extent of influence that the level of institutional quality (IQ), through interaction, has on the translation of sectoral composition of EG into PR. This study investigates the extent to which IQ influences the translation of the measures of sectoral composition of EG into PR at a global level, and in SSA relative to other regions. Using data from the Groningen Growth and Development Centre (GGDC) growth, and the World Bank PovcalNet and World Governance Indicators (WGI) institutional datasets for the period 1990-2018, the study employed pooled OLS and Two-stage Least Squares (2SLS) estimations.

Findings from the non-regional dummy global sample regression models without IQ terms reveal negative and statistically significant effects of services and agriculture value-added and the corresponding labour productivity growth on poverty. Also, there are negative and significant effect of structural change and sector productivity growth on poverty in similar regression models at global level. However, the effect of manufacturing/industry value-added and labour productivity growth are insignificant in these regression models at the global level.

In regional dummy global sample regression models without IQ terms, the effects of services value-added and labour productivity growth on poverty are negative and statistically significant in East Asia and Pacific (EAP), South Asia (SA), and Sub-Saharan Africa (SSA). Also, agriculture value-added has negative and statistically significant effect on poverty in Europe and Central Asia (ECA), Latin America and Caribbean (LAC), and Middle East and North Africa (MENA) but not in SSA. However, there is no such significant effect on poverty for manufacturing/industry value-added and labour productivity growth as well as agriculture labour productivity growth across regions including SSA. While sector productivity growth has negative and statistically significant effect on poverty in EAP, SA, and SSA, the effect of structural change on poverty is only negative and significant in EAP.

In non-regional dummy global sample regression models with IQ terms, findings show that the effects of the terms of interaction between the weighted average IQ and each of services and agriculture value-added growth on poverty at $1.90/day poverty headcount are negative and statistically significant at global level. Also, at the same global level, the effect of the term of interaction between IQ and manufacturing/industry value-added growth on poverty at $3.20/day poverty headcount is negative and statistically significant at critical threshold level of IQ.

Moreover, the effect of the interaction term between the weighted average IQ and each of the sectoral labour productivity sector growth on poverty are insignificant. However, the effect of the interaction term between agriculture labour productivity growth and each of Regulatory Quality (RQ) and Government Effectiveness (GE) on extreme poverty is negative and statistically significant at critical threshold levels of RQ and GE in the non-regional dummy global sample regressions.

In regional dummy global sample regression models with IQ terms, the effect of the term of interaction between services value-added growth and IQ on poverty is negative and statistically significant in South Asia and SSA. Also, the effects of the terms of interaction between services labour productivity growth and each of RQ and Control of Corruption (CC) on extreme poverty are negative and statistically significant in South Asia and reveal evidence of similar significant effects on PR at critical levels of IQ in other regions including SSA. Moreover, the effect of the interaction between agriculture value-added growth and Voice and Accountability (VA) and between manufacturing/industry value-added growth and each of VA and the Rule of Law (RL) on extreme poverty are negative and statistically significant at critical threshold levels of VA and RL across regions including SSA. Furthermore, the effects of the terms of interaction between structural change and VA on extreme poverty is negative and statistically significant in EAP and reveals evidence of similar significant effects on PR at critical threshold levels of VA in other regions including SSA.

The study contributes to the literature as follows: First, it demonstrates that the effects of value-added and labour productivity sectoral growth as well as structural change on PR depend on the weighted average of IQ and its dimensions apart from political stability and absence of violence. The effects are large in a high IQ environment at global level and across regions including SSA. Second, it provides better understanding of the literature on the dynamics of growth-poverty relationship through structuralist theory, where investments are directed to sectors for improved development outcomes that benefit the poor, as opposed to the neoclassical theories with less attention to the structure and sectors of the economy. Third, while different components of growth and IQ are potentially endogenous and studies rarely employ 2SLS estimations to appropriately address endogeneity for multiple endogenous variables, this study demonstrates a better understanding of the application of multiple instrumental variables in growth-poverty empirical models with at least two endogenous variables. Finally, sources have consistently argued that evidence remains unclear on the types of institutions that precisely matter for sustained EG (and the compositions) and its effective translation into improved development outcomes (Nallari and Griffith, 2011; Perkins et al., 2013; Curtis and Cosgrove, 2018; & Torvik, 2020). The study thus contributes to the literature on identifying, from the governance institutional cluster, the types of institutional dimensions that matter for the moderating effect of sectoral compositions and structural change on income PR.

Following section one on introduction, section two presents literature review and research questions and objectives, section three describes the methodology, section four presents empirical results/discussions, and section five concludes with implications.

3.2 Literature Review

3.2.1 Effect of Sectoral Value-added Shares of Economic Growth on Poverty

There is huge evidence on country and cross-country level studies comparing the effects of EG originating from different sectoral economic activities or locations on poverty. These studies generally revealed evidence of relatively high significant contribution of the agriculture sector growth to PR than growth originating in non-agriculture sectors, despite the few cases of contradictions. While the significant poverty-reducing effects of agricultural value-added growth followed by services sector growth often take the lead, the general results are consistent for both country and cross-country studies.

At country level, Ravallion and Datt (1996) used reduced-form analysis approach on time-series data for the period 1951–1991 in India. They found that the share size of agricultural and services sectors value-added growth rates had a more significant impact on PR in both urban and rural areas as well as nationally. While services sector was found to have delivered significant gains to India's poor, the industrial sector growth could only benefit some of the urban poor with no discernible effect on the poor in either urban or rural areas. In China, Ravallion and Chen (2007) employed instrumental variable (IV) and OLS estimations for analysis of rural and urban household surveys data over the period 1980–2001. Their findings revealed that growth in the agriculture sector significantly contributed to the bulk of the dramatically huge reduction in extreme poverty in China as opposed to the growth in industry/manufacturing or services sectors.

Also, macroeconomic stability (through avoiding inflationary shocks) and government spending were found to be good for rapid PR. Montalvo and Ravallion (2010) also used panel fixed effects and first differences estimations on panel data for the period 1983–2001 for rural areas and 1986–2001 for urban areas in China. Findings show that the agriculture sector was the real driving force in China’s remarkable success against absolute poverty, rather than the manufacturing or services sectors. However, the unevenness of growth process across sectors greatly attenuated the overall pace of poverty reduction.

Additionally, studies by Sumarto and Suryahadi (2004) and Suryahadi et al. (2009) used household survey data for the periods 1984-2002 and 1984-1999 respectively in Indonesia. Employing OLS and fixed-effects and then generalized least squares (GLS) estimations for the first and second studies respectively, they found in both studies that agricultural growth was the largest factor behind PR. For Sumarto and Suryahadi, agricultural growth accounts for 66 percent of overall PR, 55 percent in urban PR, and 74 percent in rural PR. The growth of industrial sector had statistically significant impact only on urban PR but with magnitude of the impact smaller than that for agriculture. The services growth has positive but relatively small and insignificant coefficient, while the effect of aggregate GDP growth on poverty was negative and statistically insignificant. This was true for total, urban, as well as rural poverty. For Suryahadi et al. (2009), the rural services growth was more related to PR in all sectors and locations, with urban services growth having the largest effect on poverty alleviation. It was also found that rural agriculture growth strongly reduces poverty in rural areas, while industrial growth has a relatively small impact on PR in both rural and urban areas.

In Brazil, Ferreira et al. (2010) used fixed effect estimation on disaggregated state and sector level GDP and poverty data for the period 1985 to 2004. They find a more significant poverty-reducing effect of services sector growth than growth in either the agriculture or industry sectors. There was evidence of heterogenous effects of industrial growth on poverty across states, but these varied with initial conditions related to human development and worker empowerment. Despite a relatively small improvement in the agricultural growth elasticity of poverty, the slow growth rate of the services sector had a minimal negative effect on the rate of PR, thereby partially offseting the increased effect of the rate of EG on poverty. However, government policy reforms in the areas of macroeconomic stabilization and income redistribution, driven by the substantial reduction in inflation rates and expansion in social security and assistance spending by government were the major sources for PR.

Rose et al. (2013) also employed OLS estimation and Augmented Dickey Fuller test for stationarity on annual time series data in Pakistan for the period 1981-2010. They found that the rate of PR is significantly affected by the growth rate of the industrial sector. While the agricultural growth rate was statistically insignificant and negatively associated with poverty, the services sector growth on the other hand contributed to the evolution of poverty. This is consistent with findings from a study by Pham and Riedel (2019) in Vietnam, which used 2SLS estimation on data for the period 2010–2016. They revealed substantial impacts of both the industrial and agricultural growth on poverty reduction, while the service sector contributed to high rate of poverty. In addition, the process of urbanization, coupled with increase in the labour rate contributed positively to PR achievements.

At cross-country and regional levels, Warr (2000) used both time series and pooled OLS estimations on data for six countries from regions of the Asian continent (South Asia, East Asia, and Southeast Asia) for a period within the 1960s and 1990s. The study finds the overall rate of economic growth per capita to be statistically significant and much more important for PR than its sectoral composition. This was approximately the same for all the six economies. While considering the sample to be too small to assert such strong conclusions, the study calls for studies on nuanced treatment of sectoral and sub-sectoral growth for improved development. Using data from across 45 countries from four developing regions (EAP, LAC, SA, and SSA), Hasan and Quibria (2004) employed a country with fixed effect estimation and found considerable regional variations for both aggregate and sectoral growth. They found that while a one percent increase in per capita income would reduce the incidence of absolute poverty by 1.6 percent in EAP, it would reduce poverty by only 0.71 percent in SSA. In terms of sectoral contributions, industrial growth had a significant impact on PR only in EAP, but in contrast it was statistically and insignificantly associated with PR in LAC. Although services and industrial growth were also insignificantly associated with PR in SA and SSA, agricultural growth appears to be the key drivers of PR in these two regions. They argue that EAP emerged successfully by promoting policies (macroeconomic stability, openness, and favorable industrial and labor market policies) and the enabling institutional environment that fosters EG and PR.

Similarly, de Janvry and Sadoulet (2010) employed descriptive analysis across regions on micro panel poverty data from different sources for the period 1992/3–2002. Results show that growth originating in agriculture was estimated to be three times more effective in reducing poverty than growth originating in the non-agricultural economy. They argued that agricultural growth does not only have strong and direct poverty-reducing effects but also have potentially robust growth linkage effects on the entire economy. Furthermore, the contribution of the rural sector to aggregate PR, largely driven by agricultural growth, is more than half of the observed total PR, which is particularly high in SSA where there is greater felt need. For different farming households, both market-oriented and market entrant households benefited most from PR effects of agricultural growth as they diversified away from agriculture as a source of income, and away from staple crops (rice) toward high value and industrial crops in agriculture. Also, the subsistence farmers who continued to produce staple crops for home consumption mainly derived their income gains from diversifying away from agriculture, towards benefiting from employment creation in agriculture and in the rural non-farm economy driven by overall agricultural growth.

In five low-income African countries, Diao et al (2007; & 2010) employed an economy-wide macro-micro linkage model. They found that non-agricultural growth, especially industrial growth, is less effective in reducing poverty than agricultural growth. Additionally, agricultural exports were found to typically benefit the peri-urban areas and not necessarily the poor in more remote rural areas. Thus, while the industrial sector remains important for boosting the economy but creates limited employment opportunities for the poor and unskilled workers, the agricultural sector is considered favourable in terms of employment share for the poor. Christiaensen et al. (2011) also used country fixed effects and OLS estimations on data for 80 countries from all continents. They find agriculture to be significantly more effective in reducing poverty among the poor in most of the low-income and resource rich countries (including those in SSA). While the effect decreases with increased inequality, the results were observed to be driven by the greater participation of poorer households in agricultural growth. On the other hand, growth in non-agriculture significantly reduced poverty among the better off poor, particularly in the presence of extractive industry and less effective in the poorer countries.

In Africa, Chuhan-Pole et al. (2014) used OLS cross-country regression on data over the period 1990 to 2010 for 29 and 31 countries respectively from SSA and the rest of the world. They found significantly larger impacts of industry and services growth on PR in the rest of the world, while in SSA the effects of agriculture and services growth on PR were found to be comparable and more statistically significant than the insignificant effect of industry growth on PR. Similarly, Cadot et al. (2016) used country and time fixed effects to estimate the elasticity of poverty with respect to growth at broad sectoral level in SSA. They found industry growth to have the strongest poverty-reducing effect, with the contribution of its sub-sectors, mainly manufacturing and mining, to be equally and statistically significant. While the three broad sectoral growth were all statistically significant at the 1% significance level, the magnitude of the elasticity of poverty with respect to industry growth was in the lead followed by services growth with magnitude inbetween the effect of growth in agriculture and industry. These results contrast, especially for industry growth, with study findings by Chuhan-Pole et al. (2014), challenging the hypothesis that there is no significant impact of industrial growth on PR in SSA. However, when results were decomposed by decade, they observed that over time the services growth has been rising while growth in industry kept shrinking. Notwithstanding, estimation results for the entire sample of developing countries revealed a lower poverty elasticity of agricultural growth and no significant poverty-reducing effect of aggregate industry growth, except for manufacturing sub-sector growth where its 1% growth rate is associated with headcount PR of 3.9%.

Recent studies have also identified agriculture as a short- to medium-term candidate for pro-poor policies for working-poor in many developing countries. Imai, Cheng, and Gaiha (2017) analyzed cross-country panel value-added agricultural and non-agricultural sector growth data from 59 developing countries using s-GMM. They found agricultural growth with a statistically stronger and significant effect on PR particularly in middle-income countries than in low-income countries. The study shows a negative and statistically insignificant effect of non-agricultural growth on PR in both middle- and low-income countries. Overall, the agriculture sector was found to be strongly linked with the non-agricultural sector and has substantial potential for reducing both inequality and poverty.

In Africa, Berardi and Marzo (2017) used simple OLS estimation on the sample of 78 pooled spells data from 24 Africa countries for the period 1980–2007. They found growth in agriculture to be significantly correlated with a decrease in poverty. Even after controlling for the average annual GDP growth of the 10 years before the considered spells, the average elasticity of poverty with respect to growth in the agricultural sector remains larger than the other sectors. Although not statistically significant, the manufacturing sector follows agriculture in terms of sectoral pro-poor strength. On average, they found the service sector growth to be neutral with respect to the evolution of poverty, while the statistically insignificant growth in mining, construction, and public administration tends to contribute to the evolution of poverty.

Dorosh and Thurlow (2018) also used economy-wide models for five African countries and found higher estimates of elasticities for agriculture than for non-agriculture with large variations of similar estimates among non-agricultural sub-sectors across countries. The poverty–growth elasticities for trade and transport services and agro-processing oriented manufacturing, especially agro-processing, were often close to, and in some cases exceeded the elasticity for agriculture. Despite the limited poverty-reducing effects of finance as well as business and government services, their results confirm that non-agricultural sub-sector growth can be equally effective as agriculture for PR. Limiting the scope to West Africa, Osabohien et al (2019) employed GMM estimation on panel data between 2000 and 2016. They found statistically significant evidence that agriculture provides the opportunity for the poor to increase their earnings to escape poverty.

3.2.2 Nexus of Sectoral Labour Productivity Growth, Structural Change, and Poverty

3.2.2.1 Evidence on Poverty-Reducing Effects of Sectoral Labour Productivity Growth

Studies examining the linkages between aggregate Labour Productivity Growth (LPG) and poverty are limited, especially for SSA. However, the available evidence on this topic revealed that the dimensions of productivity growth substantially contribute to poverty reduction. Drawn from evidence on aggregate LPG relationship with poverty, a cross-country study by the Centre for the Study of Living Standards (CSLS) (2004) employed OLS estimation on cross-country data from developing countries for the period 1970-1998. The study finds that LPG plays a substantial role in reducing poverty, and the effect was found to be stronger in countries with relatively low-income inequality. Findings also show that LPG accounts for changes in poverty better than, and about as important as that between the growth rate of GDP per capita and PR. However, the effect of an increase in LPG on PR decreases with the level of and any increase in inequality. This is consistent with a recent cross-country study by Hamit-Haggar and Souare (2018) that employed fixed- and random-effects estimations over the period and finds that, across regions, LPG is more important for PR than the commonly used GDP per capita. In line with the previous study, the impact of LPG on PR is stronger in countries with relatively low-income inequality. Thus, arguing that achieving PR in developing countries require policies and institutions that foster productivity growth with progressive improvement in income distribution.

In a Peruvian case study, Pineau (2004) finds the increasing LPG potential of a micro-level institution associated with significant PR across many dimensions, mainly material and psychological well-being, access to basic infrastructure, and capacity to manage assets. Pineau argues that at aggregate level and in the long run for developing countries with limited capital availability and rapid population growth, it is the sources of productivity growth that significantly dominate other sources for the sustained increase in per capita income. This is because additional outputs from other sources are in proportionate terms with additional inputs that mostly expand with population growth, thereby stagnating per capita income. Hence concludes that achieving productivity growth is the pathway out of poverty for the poor.

At sectoral level, several other studies have assessed the contributions of measures of LPG sectoral level to PR. Results from both country and cross-country studies generally point to the importance of agricultural labour productivity growth for PR relative to the role of other sectoral labour productivities.

In India, Datt and Ravallion (1998) employed instrumental variable, fixed effect, and a nonlinear least squares dummy variable estimations on pooled state-level panel data for the period 1957-1991 to investigate the impact of farm productivity on rural poverty. They find that in the short-run, despite the effect of adverse inflation, the differences in the trend growth rate of average farm yields/productivity (agricultural output per acre) were important for the cross-state differences in the trend rates of PR. This contrast results in differences in the state's historical trend growth rate of non-agricultural output (urban plus rural). However, they found that in the long run, agricultural productivity growth contributed to PR through higher wages and lower relative food prices. As argued, such extremely large differences in the contribution of farm and non-farm outputs to PR account for a probable reflection of the weak connections between urban EG and rural PR in India. Hence emphasised the importance of structural pattern of growth for PR.

In Africa, a study on the translation of agricultural productivity into PR by Ogundipe et al (2017) used dynamic panel data approach and System-GMM estimations for the period 1991-2015. They find that agricultural labour productivity contributes significantly to PR in Africa. The insignificance of GDP per capita in dwindling rural poverty reflects the reality that growth in other sectors does not influence the livelihood of the rural-poor farmers due to its subsistence nature.

Also, institutional quality and domestic credit to private sectors used in the model contributed significantly with largest impact on rural PR. For the impacts of broad sectoral productivity improvements on global poverty, Ivanic and Martin (2018) used Computable General Equilibrium model approaches on household surveys data from 31 countries (9 from SSA). They find that, although not always, productivity gains in agriculture are generally more effective for global PR than equivalent-sized productivity gains in industry or services. The result is consistent with those obtained even when the size of the productivity gain in agriculture is not adjusted for the lower share of agriculture in most developing countries. In order of magnitude of impacts after agriculture, the services sector's productivity gains effect is more poverty-reducing than productivity growth in industry. They argue that where poor smallholders are net food buyers with large shares of their income spent on food, when countries individually improve their agricultural productivity, their poverty reduces due to profit gains to producers, which is the same rate of PR even when more countries on average improve their productivity.

Other cross-country studies have not only looked at the independent poverty-reducing effect of sectoral labour productivity growth, but the effect of employment shares or profiles within the sectors as well. In a cross-country study, Gutierrez et al. (2007) applied the Shapley decomposition approach and OLS estimation to 39 developing countries for the period 1980-2001 to analyse the effect of aggregate and sectoral level employment/productivity profile of growth on PR. The study revealed that while increased employment share in the secondary sector (manufacturing, construction, mining, and utilities) is correlated with PR, employment-intensive growth in agriculture is correlated with evolution of poverty. However, productivity growth in agriculture is significantly correlated with PR, both through increases in the productivity of the sector and movement of workers into other sectors. On average, the secondary sector seems to represent a hub of "more productive" jobs, while agriculture is associated with lower productivity across the study countries. Thus, focusing on aggregate figure of growth and its impact on employment may not be effective for increased effect of growth on PR, but that, policymakers should highly consider the sectoral distribution of growth in terms of its employment and productivity profiles.

Analysing cross-country differential heterogeneity of poverty-reducing effect of sectoral growth and unskilled labour intensity Loayza and Raddatz (2010) employed a two-stage least squares (2SLS) estimation on data from 55 countries. They find that sectors that were more labour intensive with respect to size tended to have stronger effects on poverty alleviation. Agriculture was found to be the most poverty-reducing sector, followed by construction and manufacturing; while mining, utilities, and services do not seem to contribute to PR. The results confirm that poverty alleviation indeed depends on the size and composition of growth and that growth effect on PR is stronger when the sector-growth has a high unskilled labour-intensive inclination. In addition to agriculture, other unskilled labour-intensive sectors in the rural non-farm economy are also effective at PR. This suggests that a growth strategy for PR must focus not only on agriculture but on the growth of unskilled labour-intensive sectors.

In a comparative analysis of the effect of labour productivities on PR and sectoral population shares over time in low- and middle-income economies in Asia, Imai, Gaiha, and Bresciani (2019) employed static fixed-effect and dynamic panel system GMM estimations. The study reveals some evidence of a widening labour productivity gap between agricultural and non-agricultural sectors due to the faster growth of the non-agricultural sector. This gap contributed to both rural and urban PR over time, the reduction in national-level inequality, and the increased share of the population in the urban sector. The study also confirms that within Asia, agricultural and non-agricultural labour productivities have converged across economies with a stronger convergence effect for the non-agricultural sector due to its faster growth. That is, despite the slower growth in agricultural labour productivity, the agricultural sector played an important role in promoting non-agricultural labour productivity and thus in non-agricultural growth.

3.2.2.2 Evidence on Poverty-Reducing Effects of Structural Change

Several country-based and cross-country studies have examined the poverty-reducing effect of the components of LPG in terms of changes due to the reallocation of labour from low- to high-productivity sectors (structural change/transformation) and the other due to within-sector productivity growth. Some of these studies have accounted for analysis at and between rural and urban sectoral locations. Findings on average show that both components are important channels through which EG contributes to PR but vary across countries and regions with weaker contributions of the components to PR in SSA relative to other regions, especially developing Asia.

At country level, Hasan et al. (2015) used time series and state fixed effects estimations on combined state level poverty and output and employment data from India for 11 production sectors for the full period 1987–2009 and post-liberalization period 1993-2009. While observed great differences among productivity of sectors and considerable variations in employment shares across sectors, the study finds that structural transformation (labour reallocation from lower to higher productivity sector) is a major pathway for the translation of labour productivity into PR. This varies across states. With findings on the within sectors largely mixed, the absolute coefficient of structural transformation term is larger than the "within-sector productivity growth" term for both study periods. The study also finds the exploratory analysis indicators of financial development (including better credit markets), business regulations that promote competition, and flexible labour regulations to be all associated with larger structural transformation.

In India, Gupta and Gupta (2020) and Gupta et al. (2018) used panel fixed effects and generalized least squares estimations on surveys data and found that annual aggregate LPG has a strong and significant impact on PR across the regions that witnessed increase or decrease in poverty. Among the components of LPG, the studies revealed that while within-sector growth effect was found to have significant impact on PR, its counterpart growth in structural change had no significant poverty-reducing effect. This means that generating jobs in sectors witnessing productivity growth remains important for PR. Also, results from further decomposition of structural change into static and dynamic reallocation effects indicate that the growth rate of static reallocation had an insignificant impact on PR, whereas the growth in dynamic reallocation has a strong and significant impact on PR. It implies that the movement of workers to above-average productivity level sectors in the initial period is not poverty-reducing. The agriculture sector experienced increased growth in labour productivity but negative growth in both static and dynamic reallocation effects. This indicates that workers indeed moved out of this sector, but a small fraction of the labour that moved out of agriculture was reallocated to unregistered manufacturing that was next only to agriculture in terms of low labour productivity. The implication is that for rapid PR to occur, improving growth in productivity in the agriculture sector and pulling people out of agriculture is not enough. The pace of PR crucially depends on the productivity of the sectors that are absorbing the workers coming out of agriculture.

Also, Rifa'i and Listiono (2021) employed fixed-effects estimation on state-level panel data for 38 districts/cities for the period 2012-2015 in East Java. They find a significant impact of the services sector on PR, while the industrial sector did not. This implies that East Java experienced pre-mature structural transformation seen from the stagnation of the industry's share of the economy. It thus appears that rapid structural transformation was not encouraged in East Java in the short run, and so precisely resulted in the service sector that significantly contributed to PR.

For cross-country level orientation studies, Naiya (2013) employed descriptive statistics on data from four OIC member countries (Indonesia, Malaysia, Nigeria, and Turkey) for the period 1960-2009. The study finds that Malaysia, Indonesia, and Turkey succeeded in achieving sustained EG and development as they effectively transformed their productive activities from low to high productivity (structural transformation). They also diversified from agriculture to manufacturing and exports of finished products and thus contributed significantly to PR during the last three decades. As observed, the three countries had in common, political stability as key advantage over Nigeria, that allows their continuity of effective implementation of successful development policies.

In ascertaining whether the African region is still too poor to grow, Shimeles (2014) employed two-step GMM estimation on data from 20 African countries for the period 1960-2011. Findings revealed a much stronger significant effect of a rise in employment in the industrial sector on extreme poverty reduction than the effect due to the average growth in per capita incomes. However, about 85% of poverty had deep rooted origin in two sectors: agriculture (54%) and services (31%), whose independence or co-existence continue to limit both employment potential and the possibility of growth for significant PR in Africa. This implies that the pattern and sources of growth remain important in enhancing growth for PR, and that extreme poverty can better be dealt with through structural transformation. The coexistence of persistent poverty among self-employed in the rural agriculture and urban informal sectors with a rapidly growing modern sector put structural transformation at the centre of development policy for African countries.

A follow-up study by Page and Shimeles (2015) applied a combined method of reviews of recent evidence and the generalized method of moments (GMM) estimation on cross-country household surveys data. They find that while SSA recorded the lowest EG impact on PR compared with other developing regions across the world, there remains co-existence of low unemployment with high levels of working poor and vulnerable employment in most low-income countries in SSA. This evidence shows that the impressive EG across Africa is unassociated with rapid structural change. Across sectors, the within sector changes in especially agriculture were found to have the largest impact on overall PR, whereas in some countries growth reducing structural change was associated with the reduced impact of growth on PR. Compared with analysis results from the SSA sub-sample data, which only portrayed a complementary situation, findings for the larger sample of all developing countries confirmed that structural change matters for increased rate of PR. They further showed that foreign aid is partly responsible for the limited growth rate of employment and PR as there was little evidence to show the contribution of foreign aid to increased productive job creation in Africa. Indeed, the study reveals limited private-sector development efforts to support infrastructure and capability development for improved sectoral productivity and structural transformation in Africa. However, it identifies private investment in competitive global industries such as agro-processing, manufacturing, and tradable services as the pathway to rapid structural change associated with increased job creation and PR.

Erumban and de Vries (2021) recently employed a country-specific structural factor estimation on growth and poverty using data from the Groningen Growth and Development Centre (GGDC) and PovcalNet databases respectively over the period 1990 to 2018 for 42 developing countries. They find significant contributions of structural change to growth in developing Asia and Sub-Saharan Africa. However, the marginal productivity of additional workers in modern activities in SSA is low, holding back productivity growth, especially in manufacturing, and trade and transport services. They argue that this could be due to workers being absorbed in activities characterized by small-scale enterprises and low productivity growth. Their study also shows that PR is significantly related to productivity growth in manufacturing and structural change. An attribution exercise suggests that structural change and agricultural productivity growth account for a substantial share of PR in developing Asia and SSA, and that productivity growth in manufacturing accounts for PR in developing Asia, but this effect is not observed in SSA. Notwithstanding, considering more moderate poverty headcounts ($3.20 and $5.50 a day), they find significant poverty-reducing effect of productivity growth within business and finance services, such that the elasticity increases with more moderate poverty lines. While it observed an insignificant effect of productivity growth in agriculture, and significant effect of structural change on PR, the study evidence also showed that changes in poverty are related not only to what happens to mean income, but also to the distribution of income. Thus, focusing on either sustained growth or redistribution or both should be the strategy for effective PR.

Other recent studies have specifically focused on rural-urban or urbanization oriented cross-country analyses of the contribution of the patterns and sectoral composition of growth to PR. Christiaensen and Todo (2014) emphasized the importance of examining the role of the 'missing middle' (the aggregate of secondary towns and rural non-agricultural sector) and of mega cities in developing countries. Using OLS and two-stage least squares (2SLS) estimations on cross-country panel data for the period 1980–2004, they find that migration out of agriculture into 'the missing middle and mega cities' in that order are key to rapid inclusive growth, PR, and employment growth. While it calls for deeper reflection about urbanization processes and in-depth theoretical and empirical analyses to better unpack these location-oriented channels for regions (especially SSA) with high urban concentration, the study accords more importance to patterns of urbanization for PR.

In a follow-up study to better understand the contribution of sectoral urbanisation to PR, Imai, Gaiha, and Garbero (2017) used panel fixed or random effects as well as system GMM estimators on updated cross-country panel data used by Christiaensen and Todo (2014) over the period 1980 to 2010 for 44 developing countries. They considered the sectors to be in different locations with different dynamics between non-agricultural and agricultural sectors, and between non-agricultural in rural areas and secondary towns. They thus disaggregated 'the missing middle' (the aggregate of secondary towns and rural non-agricultural sector) and treated rural non-agricultural sector and secondary towns separately in addition to rural agricultural sector and mega cities. They find that the absolute magnitude of the longer-term poverty-reducing effect is larger with increases or changes in population share in the agriculture sector than with the rural non-agricultural sector. They also find the non-agricultural sector poverty-reducing in some cases but with magnitude much smaller than the agriculture sector. Contrary to Christiaensen and Todo (2014), they find no evidence of PR attributed to the growth of population in mega cities, which in fact contributes to the evolution of poverty in a few cases. Furthermore, an increase in conflict intensity and improvement in institutional quality were key determinants of PR.

Most recently, Benfica and Henderson (2021) employed fixed effect estimation on panel data for 31 SSA and 39 other developing countries within the period 1980s-1990s. They used sectoral labour productivity and structural transformation as the analytical components of

EG at urban and rural sector level. Findings show that the semi-elasticity of rural poverty with respect to agricultural labour productivity is highly significant and relatively large in magnitude, particularly for countries with little dependence on natural resources. Furthermore, the semi-elasticity of urban poverty with respect to non-agricultural productivity growth was found to be large and highly statistically significant, whereas structural transformation (employment growth) also contributed significantly to rural PR, particularly for countries at low initial levels of development. However, for those regions with initially higher levels of GDP per capita, growth in employment-to-population ratio was found to be critical for PR, particularly in rural areas. With little information about the past contribution of different sources of EG to rural and urban PR conveyed by semi-elasticity estimates, the study used regional dummies regressions via interaction effects to quantify these contributions across regions. Accordingly, they found that agricultural productivity growth has contributed relatively little to rural and urban PR across all regions of the world, while non-agricultural productivity growth made substantial contributions in almost all regions, mainly via PRs in urban areas.

3.2.3 Evidence on the Nexus of Economic Growth and Structural Transformation in Africa

Theoretical and empirical literature have identified the two historical structural transformation pathways through which labour productivity growth can increase, namely: structural change and sector productivity growth (Lewis, 1954; Fei and Ranis, 1964; McMillan & Rodrik, 2011; and De Vries et al., 2015). These pathways contribute to productivity growth and employment expansion that provides the major link between growth and PR (Byiers et al., 2015; and Islam, 2004). Through distribution of income among populations, such pathways subsequently contribute to inclusive and sustained EG and improved PR and human development (Islam, 2010a; 2010b; Islam, 2015). However, studies on structural transformation (more so structural change) in SSA, especially its causal relationships with PR (and human development) are mostly limited to the rich descriptions of labour productivity growth and its structural patterns, with the results inferred on PR and human development (Mcmillan & Rdrik, 2011; Mcmillan et al, 2014; De Vries et al, 2015; Fox et al, 2017; Busse et al, 2019; Karimu, 2019; Ssozi and Bbaale, 2019; Diao et al., 2019; Adegboye & Ighodaro, 2020; and McMillan and Zeufack, 2022). These studies used a combination of methods of econometric estimations and the decomposition of labour productivity growth into components of structural change and within-sector productivity growth. On average, they find that despite the impressive EG performance, many African countries are going through premature de-industrialization that is contrary to historical pattern of economic transformation. Hence limiting the region's capacity to generate quality jobs and rapid and sustained EG for improved PR.

In 11 African countries, McMillan and Rodrik (2011) and Mcmillan et al (2014) observed that structural transformation to be associated with reduction in average labour productivity growth due to movement of labour from higher- to lower productivity employment sectors, typically in the urban services sector. They found aggregate labour productivity in these countries to have grown at only 0.9 per cent annually for the period 1990-2005 with a positive sector labour productivity growth of 2.1 per cent and a negative contribution of structural transformation of 1.3 per cent. However, they seemed to have observed things turning around over the period after 2000 in Africa. In this period, they find positive contributions of structural change to aggregate productivity growth in Africa. Their evidence shows that the negative structural change is accounted for by oil- and mineral dependent countries, where the share of agriculture has expanded over the period with shrinking shares of manufacturing and services. However, the very low levels of productivity and industrialization across most of the continent indicate an enormous potential for growth through structural change.

Expanding the data set used by McMillan and Rodrik (2011) for the same 11 countries over the period 1960 to 2010 with detailed sectoral coverage, De Vries et al. (2015) used a panel data regression and found that development patterns in Africa largely differ from earlier periods. According to De Vries et al., the substantial growth period 1960-1975 occurred behind high tariffs with active government support to the expansion of manufacturing activities and its share in total employment backed by developed rudimentary technological capabilities. This led to improved manufacturing productivity growth associated with growth enhancing structural change. Conversely, while both productivity growth and structural transformation stagnated over the period 1975 to 1990, the study reveals that activities in market services, such as trade, transport, communication, and business services expanded in the 1990s. While these sectors productivity levels overtook the economy average, productivity growth was increasingly felling up to the point of felling behind the global frontier, leading to static reallocation gains but dynamic losses. While emphasised the importance of distinguishing between static and dynamic reallocation effects, the study calls for a deeper understanding of the forces underlying ST in Africa's recent growth period.

Response to the call by De Vries et al. (2015) triggered several other studies. Fox et al (2017) in a study for about 30 African countries for the period 2000-2010 shows that there was ST in some sub-Saharan African countries during 2000–2010 as well as convergence in sector productivities within countries. However, they argued that the change was due to strong movement in the shares of labour and output out of agriculture into services rather than into manufacturing/industry. This shift relatively lowered productivity in services, in part because much of the movement resulted into employment absorbed in lower-productivity non-agricultural and non-tradable services sectors. Accordingly, Fox and others identified common factors for the slow movement of output and employment into the manufacturing sector and the heterogeneous services sector (with high and low productivity segments). These include rapid labour force growth, slow expansion of the tradable sector that can employ low and moderately skilled labour and can exhibit capacity for productivity growth, and the general weakness of productivity in the services sectors compared to the manufacturing sector.

Employing a two-step GMM estimation on data for 29 SSA countries for the period 2000–2015, Ssozi and Bbaale (2019) finds that SSA is undergoing a non-classical structural transformation led by the service sector instead of manufacturing. Import penetration, a key variable of international contact, has negative coefficients for both the agricultural and manufacturing shares of gross domestic product (GDP) but is positively associated with both the services shares of employment and GDP. They argued that such import penetration and foreign direct investment are the likely international constraints that are making the structural transformation of SSA non-classical.

Also, Adegboye & Ighodaro (2020) used data for 10 SSA countries for the period 1970-2014. They find that the pattern of structural change in SSA has led to more low-productivity and vulnerable jobs generation. They argued that rising shares of the traditional services sector in the economy has driven a large segment of employment into informal low-wage jobs. They also observed that major consequences of the nature of demographic changes in the SSA region were found to include a decline in the overall employment rate and large movement of the labour market towards less productive and low-wage employment. Notwithstanding, transition of the economy to the services sector has also been shown to be a fundamental condition for generations of employment in the region. It was demonstrated that more employment has flowed onto the less productive segments of the traditional services sector.

Contrary to the above literature, other recent sources present evidence of significant contributions of ST to EG in Africa. Using panel fixed effects and GMM estimations on data for 41 SSA countries for the period 1980-2014, Busse et al. (2019) find that aggregate growth was mostly driven by structural transformation in the 1980s and 1990s, while in recent years (2000–2014) within-sector improvements and structural transformation contributed almost equally to aggregate growth in Africa. Their regression analysis provides robust evidence for the significant impact of structural transformation on growth in Africa, because of dynamic labour shifts from agriculture to other (high productivity) sectors. Hence structural transformation is a stable long-run factor for EG in Africa.

Similarly, Karimu (2019) used dynamic cross-country panel data model and least squares with dummy variables (LSDV) estimation for 41 SSA countries for the period 1991-2017. The study finds that changes in the share of labour in agriculture do not have any statistically significant effect on the growth of labour productivity over the period, neither should it (ideally) translate into some rise in productivity of the sector, nor contribute positively to the growth of aggregate labour productivity. Rather, changes in the share of labour in industry and services appear to contribute significantly to aggregate labour productivity growth, with services showing potential to become the lead contributor to productivity growth in developing countries.

Resonating with Busse et al. (2019) and Karimu (2019), and providing better explanations, Diao et al. (2019) reviewed and updated evidence from the work of McMillan and Rodrik (2011) on structural dualism in developing countries. They related this structuralist perspective to the neoclassical growth model using a two-sector general equilibrium model to explain and compare the recent rapid growth episode across selected countries in SSA, Latin America, and East Asia. While the study results were consistent with that discussed in McMillan and Rodrik (2011) for the other two regions, a different but puzzling result emerged for SSA pattern. Diao et al. (2019) finds significant growth-promoting structural change that has been accompanied by mostly negative labour productivity growth within non-agricultural sectors in the study countries. As evidence of the relatively poor performance of the manufacturing sector in SSA, the growth, instead of the modern sector, is being driven by positive aggregate demand shocks due to foreign transfers or by productivity growth in the traditional (agriculture) sector. Their result is consistent with that obtained by McMillan and Zeufack (2022) who finds structural change to have significantly contributed to growth in Africa, after being accompanied by growth acceleration in the 2000s, while the contribution of sector productivity growth in the non-agricultural sector is close to zero.

As explained by Diao et al. (2019), the modern sector expanded and allowed growth-promoting structural change to take place as increased demand spills over to the modern sector, suggesting that positive structural change in African countries may be driven mainly from the demand side, whether due to external transfers or the induced demand effects from increased agricultural incomes. Indeed, the study reveals the key role played by the agriculture sector both on its own account and as a driver of growth-promoting structural change in SSA. However, the study in line with McMillan et al. (2017) argued based on theoretical traditions that offer complementary perspective on the two EG models: The neoclassical model (growth processes within the modern sectors), and the dual-economy model (relationships and flow of resources among sectors). This means that the recent rapid growth occurring without the modern sector experiencing rapid productivity growth on its own, is likely to face a slowdown and even be unsustainable due to the self-extinguishing /limiting nature of the productive structural change.

In this case, part of the recommendation is to increase diversification into non-agricultural products and the adoption of improved production techniques for enhanced agricultural transformation into modern activity. However, if productivity growth is limited in these modern sectors combined with a low-income elasticity of demand for agricultural products, the modern activities may not necessarily absorb the inevitably released labour by the agriculture sector, thereby stalling economywide growth. The remedy for this as proposed by Diao et al. (2019) and McMillan et al. (2017) is that sustained and inclusive growth are achieved for the most part, through steady state accumulation of human capital (education and skills training) that drives long-run income, and improvement in the quality of institutions (governance, rules of law, and the business environment) needed to generate sustained productivity growth.

3.2.4 Research Questions and Contribution to Literature

The literature reviewed generally identified key gaps/challenges currently faced in SSA and in the growth-poverty literature. Summaries of these findings are presented below.

Literature reviewed in this study has largely revealed that agriculture value-added growth has a relatively significant effect on PR at global and geographical regional levels than other sectors. In SSA, the evidence is more prominent in especially rural areas due to high employment concentration of the poor in the sector. However, agricultural labour productivity growth and its contribution to PR are both insignificantly low relative to the services and manufacturing sector growth in SSA (Diao et al., 2007 & 2010; de Janvry and Sadoulet, 2010; Christiaensen et al., 2011; Chuhan-Pole et al., 2014; Imai, Cheng, and Gaiha, 2017; Ogundipe et al., 2017; Osabohien et al., 2019; and Dorosh and Thurlow, 2018).

Also, rapid structural change is lacking in SSA (Page and Shimeles, 2015; Page, 2015; & Shimeles, 2014). This, according to these sources, is because about 85% of the origin of poverty is deeply rooted in two sectors: agriculture (54%) and services (31%), whose independence or co-existence continue to limit both employment potential and the possibility of growth for significant PR in Africa. They emphasised the co-existence of low unemployment with high levels of working poor and vulnerable employment in most low-income countries in SSA, which reveals the evidence of impressive EG across Africa to be unassociated with rapid structural change. Also, they argue that in SSA, the within sector changes, especially agriculture, have the largest impact on overall PR, while growth reducing structural change in some of the countries is associated with the reduced impact of growth on PR. Furthermore, while there is high dependence of most SSA countries on foreign aid for PR, there is little evidence to show the contribution of foreign aid to increased and productive job creation in Africa, and thus partly responsible for the limited growth rate of employment, whic is the major pathway to sustained PR. Despite the impressive economic performance, many SSA countries are going through premature de-industrialization as opposed to the historical patterns of economic transformation in other regions such as Asia, Europe, and North America.

While manufacturing has a higher rate of technology transfer with a higher potential for productivity catch-up, the employment absorption in the non-agricultural sectors is mainly concentrated in the informal and weak productivity services sector. The transformation is dominated by high shares of vulnerable employment from low-productivity agriculture sector into low-productivity informal services sector, mainly the household enterprises in the trading and personal services sectors that have limited potential for international markets. These have constrained the positive contribution of structural change to average labour productivity growth in Africa, which is the major link between growth and poverty (Mcmillan & Rdrik, 2011; De Vries et al, 2015; Page and Shimeles, 2015; Fox et al, 2017; Diao et al., 2019; Adegboye & Ighodaro, 2020; Erumban and de Vries, 2021; & Benfica, and Henderson, 2021).

Although the composition of growth and its overall intensity remains important for PR, there is limited exploitation of the extractive primary commodity natural resources to promote economic diversification in the commodity-driven growth sectors that currently lack pro-poor potential in most African economies (Mcmillan & Rdrik, 2011; De Vries et al, 2015; Berardi and Marzo, 2017; Fox et al, 2017; Diao et al., 2019; and Adegboye & Ighodaro, 2020). Hence, a stagnated or declining share of the labour force in the high-productivity manufacturing sector. In addition to the dismal initial conditions in terms of per capita income, institutional capacities, and social development, the concentration of growth in commodity exports is not conducive to PR in Africa. Regardless of these opportunities, they argued that establishment of the high value-addition productivity extractive industries are very capital-intensive and requires infrastructure that is lacking in Africa. Moreover, the extractive industry sector has limited backward spillover linkage with other sectors in terms of supply chain or demand for locally produced goods and services (Chuhan-Pole, P., 2014).

The sources also hold a general view that most SSA countries lack the enabling environment that encourages both agricultural and non-agricultural sector productivity growth. The studies indeed identified critical challenges that developing countries like SSA continue to face. These include the limited access to and investment in infrastructure and human capital development, lack of and adoption of improved technological innovations for productivity across sectors, limited private sector investment and participation of the poor and other actors in growth processes, lack of conducive environment for doing business through a functioning credit market, and the absence of flexible labour and competitive business regulations.

Across literatures reviewed, it is generally argued that the increased growth rate of population and the rising levels of inequality in income and access to social infrastructure and services are key barriers dampening the poverty-reducing effect of EG in developing countries (Ravallion and Chen, 2007; Christiaensen et al., 2011; Thorbecke, 2014; Chuhan-Pole, 2014; and Erumban and de Vries, 2021).

In terms of population, Chuhan-Pole (2014) and Filmer and Fox (2014) emphasised is because the population of Africa continued to grow rapidly than any other developing region in the world during that period with an annual average growth rate of 2.7 percent. For instance, Chuhan-Pole (2014) and Filmer and Fox (2014) emphasised that SSA had the highest total fertility rate of 5.1 total births per women in 2012 in the world and more than twice as high as that of South Asia. This, as they argue, has contributed to the swollen population of youth to about half of the population below 25 years of age in the region. It has also muted improvement in livelihoods as evidenced by an average annual per capita income growth rate of 1.8 percent, relative to the average annual real output growth rate of 4.5 percent in the region, and in the rest of the developing world over the same period.

Also, three-quarters of the population concentrated in the rural areas in the SSA region, especially in low-income countries primarily rely on the low productive agricultural and informal services sectors for their livelihoods. Moreover, Thorbecke (2014) and ACBF (2017) argue that over the rapid growth period, SSA accounts for a significant proportion of most unequal countries in the world, due to endemic inequality that is limiting the benefit of growth from reaching the poor. Indeed, recent estimates show that there are 16 billionaires in SSA, along with 358 million people living in extreme poverty with seven out of every 10 people living in countries with fast growing inequality (ACBF, 2017; and Milanovic, 2009).

As recommended, these studies call for inclusive institutional and policy environments that can promote public and private sector investments and development, good governance, the effective participation of the poor in sectoral economic activities and benefits, the increased access to and efficient allocation and distribution of resources, and political and macroeconomic stability, to improve sectoral production and productivity growth for sustained and inclusive EG and PR in developing countries. As they emphasised, such policies and institutions should attract investment in rural infrastructure development, agricultural research, agribusiness development, and the capacity building of actors including smallholder farmers as well as the rapidly growing youth population. Moreover, the investment should prioritise institutional capacity building in management and skills training necessary for transition of the work force from agriculture to higher productivity non-agriculture sectors. It should also influence access to improved modern farming technologies, financial services and credit markets, and markets for agricultural commodities.

Looking at the recent growth period, the studies recommend a deeper understanding of the root causes of Africa's high economic dependency and low agricultural labour productivity. Most importantly, these studies recommend appropriate and effective policies and institutions that encourage steady state accumulation of physical and human capital for addressing the gaps/challenges in literature. Such capital accumulation should drive long-run income and the growth of other sectors, such as through diversification into non-agricultural products supported by adoption of improved production techniques. This allows integration and interdependence among the various sectors to stimulate demand for industry related agricultural commodities produced through agro-industries. The environment should encourage efficient taxation, better management of resource wealth, transparency in contracting and effective public spending, and accountability of government and other actors to citizens to compensate the weak effect of the African commodity-driven growth on poverty.

Despite the general recommendations in literature calling for effective policy and institutional environment as a major pathway for substantial poverty-reducing effect of growth, **no** rigorous study has been conducted in SSA to empirically examine and test the extent of interaction influence that IQ has on the translation of sectoral composition of EG and structural change into PR. As the main contribution to literature/ knowledge and development policy, this study attempts to undertake a global level cross-regional and a regional level cross-country empirical analyses to address the question:

To what extent does IQ influence the poverty-reducing effects of sectoral value-added and labour productivity growth as well as structural change and sector productivity growth at global level and in SSA relative to other regions?

By exploring these questions, the study also provides evidence on the role of IQ in enhancing productivity and the translation of sectoral composition of EG in SSA, and to guide policy makers, practitioners, and academics for designing appropriate intervention framework to tackle growth-poverty related challenges faced in SSA. It also provides better understanding of the literature on the dynamics of growth and development as it attempts to address the problems of growth-poverty relationship through structuralist theory as opposed to the neoclassical growth theories. The structuralist considers economic structure in how to improve productivity, employment, and welfare. On the other hand, the neoclassical growth theory does not consider economic structure nor whether it matters which sector of the economy that investments should be directed for improved development outcomes that can benefit the poor.

3.2.5 Specific Objectives of the Study

In exploring solutions to the current research questions, this study investigates the interaction effects of institutional quality (IQ) and sectoral compositions of growth on PR at the global level and in SSA compared to other regions with the following specific objectives:

i. Analyse the extent to which IQ influences the translation of sectoral value-added growth into PR at global level and in SSA relative to other regions.

ii. Examine the extent to which IQ influences the translation of sectoral labour productivity growth into PR at global level and in SSA relative to other regions.

iii. Assess the extent to which IQ influences the poverty-reducing effects of structural change and sector productivity growth at global level and in SSA relative to other regions.

3.3 Methodology

3.3.1 Theoretical and Conceptual Understanding of Structural Transformation for Growth and Poverty Reduction

The sectoral patterns of growth originate from the theories of structural dualism using the Lewis (1954) two-sector models of development and its expanded version by Fei and Ranis (1964). While recognising the importance of capital accumulation in the growth process that is built on the neoclassical growth model of Solow and others, the model of structural dualism elaborates on economies operating on two-sector models, namely, the traditional (agriculture) and modern (industry/manufacturing and services) with different economic activities within each sector.

Presented in the work of others (Norton et al., 2010; Bender, 2012; Perkins et al., 2013; Roland, 2014; McMillan et al., 2017; Lopes et al., 2017; and Diao et al., 2019), the model assumes that different economic mechanisms are at work within each of the sectors and therefore cannot be lumped together. Mainly, all capital accumulation, innovation, and productivity growth are assumed to take place in the modern sector to produce for sale on domestic and world markets at a profit. In the traditional sector, it is assumed that there is a fixed amount of land for subsistence production, and that any excess of production in the traditional sector above the required for household consumption is eventually sold or exchanged on local markets.

Another assumption is the possibility for the traditional sector to release large amounts of labour without losing any output and for which the sector remains technologically stagnant with initially low productivity. According to Norton et al. (2010), this is built on the assumption that large population exists in the traditional agriculture sector, making the marginal product of labour way below the wage rate determined by the prevailing market wage. Also emphasised by Norton et al. is the assumed existence of disguised unemployment, such that the level of production will remain the same or drop very little upon removing the people who appear to be working in the traditional sector.

Such structuralists mechanisms may lead to differences in the levels and growth rates of productivity and the implications for relative increasing return to scale (wages and returns on investment). Also, the dualistic approach in combining unlimited labour allocation and migration from rural (agricultural) to urban (industrial) areas or sectors may create profit that can be used or reinvested in capital, making labour more productive. This leads to the expansion of the modern sector that further contributes to more productive labour and hence to sustained EG.

This evolution of a dualistic nature of an economy's structure, moving traditional farmers from rural low-productivity sector (agriculture) into the high-productivity modern sector (industry) in the urban areas is viewed in the Lewis (1954) and Fei and Ranis (1964) theoretical framework as structural transformation/change. This theory, originally limited to the sectors of agriculture in rural areas and non-agriculture (industry) mainly in the urban regions, has now been expanded to other sectors such as services and sub-sectors by recent and ongoing literature on structural change (Chenery et al., 1986; McMillan and Rodrik 2011; de Vries et al. 2012; and Erumban et al. 2019).

Literature has now generally defined Structural Transformation as a concept that deals with the allocation or shifting of labour resources from the low-productivity traditional (agriculture) sector to high-productivity modern (industry/manufacturing and services) sector (Lewis, 1954; Fei and Ranis; 1964; Rodrik et al., 2016; and Lopes et al., 2017). According to the theory, such pattern of resource allocation leads to changes in sectoral composition with increased investment in capital in the industry or high-productivity growth sectors. This leads to industrialization, which contributes to increased productive jobs and a rise in output per worker, increased incomes of workers entering the modern sector with higher productivity, and hence economywide growth and PR.

As presented in Lopes et al. (2017), early theoretical literature on structural transformation (ST) mostly focused on the experience of western economies with limited scope. That ST is the change in the sectoral composition of output and pattern of labour employed, as the economy develops over time, due to the realocation of labour from low-productivity to higher-productivity sectors. This raises workers' productivity, which in turn contributes to accelerated EG (Lewis 1954). According to Rostow (1960), development occurs in such an economic context in the form of capital accumulation in the high-productivity industrial sector with the support of migration of labour from low-productivity subsistence sectors.

In the process of structural transformation, sources (Kuznets 1966; and Gerschenkron 1962) argue that the share of agriculture in aggregate GDP declines, while the share of manufacturing income substantially increases. These enable countries to engage in widespread industrial upgrading and diversification that generate jobs and raise incomes. Also, Kuznets (1966) identified the shift in population distribution between the rural and urban areas, and the increase in the relative size of capital–labour ratio in the non-agricultural sector of the economy as other channels linking a country's economic structure with its income level. Consistent with Kuznets (1971), recent empirical studies (McMillan and Headey, 2014) argue that the distributional shift is triggered by technological change and a set of interrelated changes in social institutions and beliefs brought about during the process of industrialization and urbanization. Key aspects of such social changes as revealed by others (Timmer and Akkus, 2008; Timmer, 2014; and Bender, 2012) are rapid urbanization through rural-urban migration, and the demographic transition characterized by high birth and death rates of traditional societies replaced by low rates of birth and death.

Other empirical work (McMillan and Rodrik, 2011) has shown that structural transformation can occur through two components of labour productivity growth, namely, structural change (the allocation of labour across sectors), and sector productivity growth. They argue that there are large productivity gaps within or among firms in the same sector. Drawn from ECA and AUC (2014) such productivity gaps are often associated with inefficientt allocation, market failures, and the need for state policy to reallocate resources towards higher-productivity activities across and within the modern manufacturing sector.

The above theoretical and empirical evidence revealed the way ST in a broader sense may be described, and the different ways it can be measured. In line with the above literature, Lopes et al. (2017) considers ST as a process of long-term increase in economic output in real GDP (or GDP per capita), characterized by key economic and demographic changes. These include: a decline in the share of agriculture in GDP and total employment over time; increase in the share of non-agriculture sectors (industrial and services) in GDP and total employment; an increasing ratio of average labour productivity outside agriculture to that in agriculture with increasing agricultural labour productivity; rapid urbanization due to rural-urban migration; changes in the composition of exports in favour of high value-added products; and a demographic transition from high to low rates of birth and death.

In describing the Lewis Model, Norton et al. (2010) argue that an increase in the population and rise in incomes in the industrial sector will lead to a rise in the demand for food. If such increases are not accompanied by an increase in agricultural production, there will be an eventual increase in agricultural commodity prices relative to industrial prices. This price increase, in turn, raises the wage level at which employers can influence worker's movement from agriculture to the industry sector. This thus mainly requires technological improvement in both sectors for improved productivity to overcome the possible constraints that EG would likely face.

Indeed, the structural dualism theory of economic development emphasised the role of agricultural growth in the early stages of the development process when agriculture represents a large share of the economy with its diminishing contribution as the sector gets smaller over time. While this process results in structural transformation, the Lewis (1954) model inherently explains that the non-agricultural growth, especially industrialization, is dependent upon the improvement of the indirect potential contributions of the rate of agricultural growth. He argues that the withdrawal of labour from agriculture or the absence of increasing agricultural productivity would eventually result in reduced food supply, increased food prices, and thus lower real wages in industry. It would thus be of no profit to produce a growing volume of manufacturing output without agricultural production growing, hence the reason for the simultaneous interventions of both industrial and agrarian revolutions in developing countries that are still largely characterized by structural dualism.

Furthermore, others (Johnston and Mellor, 1961; Mellor, 1999; and Schneider and Gugerty, 2011) argue that even when the direct contribution of agriculture to growth diminishes over time, it may still contribute indirectly to EG through its effect on growth in non-agriculture sector. This, they discussed in a theoretical framework of multiplier and intersectoral linkages of agriculture's important contributions in the dynamics of structural transformation. In that framework, they argued that increased quantity of food supplies for domestic consumption due to increased agricultural productivity, in turn increases farmers' incomes and their demand for non-agricultural goods and services. That the increased agricultural productivity, coupled with increased demand for non-agricultural goods and services then released surplus agricultural labour for industry, to keep increased affordability for industrial workers, leading to increased non-farm household employment and incomes. Moreover, they argue that agriculture provides a domestic market for industrial output, serves as a supply of domestic savings, and as a source of foreign exchange.

Given that the size of sectoral value added and worker availability as well as movements across sectors can enhance productivity and incomes within sectors and in the aggregate economy, the sectoral patterns of growth thus provide important channel(s) through which EG is linked to PR (Chen and Ravallion 2004; Loayza and Raddatz 2010; Ravallion 2004). Indeed, sources (Benfica and Henderson, 2021; and Montalvo and Ravallion, 2010) have put forward two reasons for which sectoral composition of economic activity affects the growth-poverty relationship. These include: the recognition that economic growth may occur in sectors that do not benefit poor people; and that the composition of economic activity can affect income inequality with subsequent implications for the effect of growth on poverty.

3.3.2 Empirical Specification for the Nexus of Sectoral Value-Added Growth, Institutions, and Poverty

The model is required to analyse the extent to which high IQ influences the translation of the rates of change in the independent sectoral value-added composition of GDP as a measure of EG into PR. The model is built on the basic analytical relationship of others (Ravallion and Datt, 1996; Ravallion & Chen, 2007; Ferreira et al, 2010; and Christiaensen et al., 2011) as follows:

$$\Delta InP_{it} = \alpha_i + \beta\Delta Iny_{it} + \varepsilon_{it} \quad (1)$$

Where P_{it} represent measures of poverty headcount ($1.90 and $3.20 a day), $\Delta InP_{it} = InP_{it} - InP_{it-1}$ (annualised log-change in poverty headcount), $\Delta Iny_{it} = Iny_{it} - Iny_{it-1}$ (annualised log-change in GDP per capita or mean income), i is the country index for the period t, ε_{it} is the error term (white noise-error process that includes errors in poverty measure and changes over time t), t-1 is the year-observation before time t, while α_i is the country-level fixed effect, and β, the estimation parameter, is the growth elasticity of poverty.

Analysing the impact of the sectoral composition of growth on poverty is achieved according to literature (Ravallion and Datt, 1996; Ferreira et al, 2010; Montalvo & Ravallion, 2010; Ravallion & Chen, 2007) by splitting the aggregate GDP per capita into the components real value-added contribution resulting into the widely used broad sectors, j, of growth compositions, mainly primary (agricultural -A), secondary (industry & manufacturing -I), and tertiary (services -S) components.

This requires the aggregate real GDP value-added (Y) from GDP per capita, y_{it}, which is given in terms of Y and total population (N) as follows:

$$y_{it} = \frac{Y_{it}}{N_{it}},$$

From which, $$\Delta \ln y_{it} = \Delta \ln Y_{it} - \Delta \ln N_{it} \quad (2)$$

Where $\Delta Iny_{it} = Iny_{it} - Iny_{it-1}$ (annualised log-change in GDP per capita or mean income), $\Delta lnY_{it} = InY_{it} - InY_{it-1}$ (annualised log-change in GDP output), $\Delta lnN_{it} = InN_{it} - InN_{it-1}$ (annualised log-change in population)

Ravallion and Datt (1996) argue that the composition of GDP per capita in any developing country is expected to change over time, as economic activity shifts from one sector to the other, especially from primary to secondary and tertiary sectors. Thus, growth in each sector cannot be expected to have the same proportional poverty-reducing effect, especially when the sector accounts for a small share as compared to a large share of the overall GDP.

Additionally, the differential poverty impact of growth of a sector at a time will naturally depend on the size of that sector over the others. Thus, having already taken the first-differences specification, Ravallion and Datt (1996) and Ravallion & Chen (2007) suggest that the change in GDP growth can be approximated as follows:

$$\Delta \ln Y_{it} \approx H_A \Delta \ln Y_{Ait} + H_I \Delta \ln Y_{Iit} + H_S \Delta \ln Y_{Sit} = \sum_j H_j \Delta \ln Y_{jit} \qquad (3)$$

where $H_A = \frac{Y_{Ait}}{Y_{it}}$, $H_I = \frac{Y_{Iit}}{Y_{it}}$, and $H_S = \frac{Y_{Sit}}{Y_{it}}$, indicate the share of each sector in GDP, and Y_{Ait}, Y_{Iit}, and Y_{Sit} indicate the real Agriculture (A), Industry (I), and Services (S) value-added growth respectively, and j is the sector, where j = A, I, & S.

Substituting equation (3) into equation (2) and then together into equation (1) gives the model for sectoral growth impact on poverty reduction as follows:

$$\Delta \text{InP}_{it} = \alpha_i - \beta_1 \Delta \ln N_{it} + \sum_j \beta_j H_j \Delta \ln Y_{jit} + \varepsilon_{it} \qquad (4)$$

$$(i = 1, \ldots, n;\ t = 1, \ldots, T;\ r = j = 1,2\&3)$$

This study relies on the historical and theoretical hypotheses on the importance of institutions for long-run growth economic growth (Engerman and Sokoloff, 1997 & 2002; Acemoglu et al., 2001&2002; and Acemoglu and Robinson, 2012). They claim that colonizers settled in large numbers in colonies with low initial native (and enslave) population density, low settler mortality, and low geographic endowment and created inclusive institutions. In contrast, colonies with high initial native (and enslaved) population density, and both high settler mortality and endowment, ended up in a dual political economy that inherited extractive institutions with small elites governing the rest. Indeed, empirical studies have revealed the evidence (Knack and Keefer, 1995; Hall and Jones, 1999; Rodrik, 1999; Nawaz et al., 2014; and Siyakiya, 2017). In addition to the importance of institutions for EG, other theoretical evidence (Alence, 2004; Szirmai, 2005; & 2008; Bluhm and Szirmai, 2012; and Fosu, 2022) have hypothesised that the extent to which EG transforms into other socio-economic outcomes (improvement in human development, and reductions in poverty and inequality) is influenced by the quality of institutional environment.

Following the above theoretical hypotheses, this study assumes the sectoral growth elasticities of poverty (β_j) to vary linearly with initial institutional quality (IQ_{it-1}) as below:

$$\beta_j = k(IQ_{it-1}) = \beta_{1j} + \beta_{2j} IQ_{it-1} \qquad (5)$$

Where k is a "transference" function, which represents the transformation of each sectoral component of EG into PR; and IQ_{it-1} is a measure of institutional quality to influence the transformation process.

In line with other studies (Tebaldi & Mohan, 2010; Chong and Caldero´n, 2000; Hasan et al., 2006; Doumbia, 2019; and Cepparulo et al, 2017) who revealed evidence of significant effect of IQ on PR, this study accounts for individual effect of IQ on poverty.

So, substituting equations (4) into equation (5) and accounting for the independent effect of IQ gives

$$\Delta \text{InP}_{it} = \alpha_i - \beta \Delta \ln N_{it} + \sum_j \beta_{1j} H_j \Delta \ln Y_{jit} + \sum_j \beta_{2j} H_j \Delta \ln Y_{jit} * IQ_{it-1} + \beta_3 IQ_{it-1} + \varepsilon_{it} \quad (6)$$

The initial institutional quality, IQ_{it-1}, is measured as the index of the weighted average of the Six Worldwide Governance Indicators (voice and accountability, political stability and absence of violence, control of corruption, rule of law, regulatory quality, and government effectiveness) derived from Principal Component Analysis (PCA), $H_j \Delta \ln Y_{jit}$ is the share-weighted growth rates of the sector j, $\Delta \ln Y_{jit}$ is the rate of growth of value-added for sector j (3 sectors) in country i, over the period t, and $H_j \Delta \ln Y_{jit} * IQ_{it-1}$ represents the interaction term for IQ_{it-1} with the share-weighted growth rate of sector j for country i over the period t.

Previous studies on sectoral composition of growth including Datt and Ravallion (1998) and Son and Kakwani (2004) in agreement with others (Ravallion and Datt, 2002; Suryahadi and Hadiwidjaja, 2011; Pham and Le, 2012; Suryahadi et al., 2009 & 2012; and Pham and Riedel, 2019) suggest the need to control for the effects of initial conditions. Adopted here are the initial conditions used in those studies, including initial inequality and initial human capital (in this study, initial life expectancy). Also following other sources (Ravallion, 1995; Besley & Burgess, 2003; Adams, 2004; Sembene, 2015; and Adeleye et al., 2020), the poverty-reducing effect of growth depends on the rate of EG and changes in inequality. Put together, Equation (6) becomes as below.

$$\Delta \text{InP}_{it} = \alpha_i - \beta \Delta \ln N_{it} + \sum_j \beta_{1j} H_j \Delta \ln Y_{jit} + \sum_j \beta_{2j} H_j \Delta \ln Y_{jit} * IQ_{it-1} + \beta_3 IQ_{it-1} + \beta_4 \Delta \ln Gini_{it} + \beta_5 \mathbf{E_{it}} + \varepsilon_{it} \quad (7)$$

Where all the identified variables for Equation (6) are maintained, $d\ln Gini_{it}$ is the annualised log change in inequality measured as Gini coefficient, $\mathbf{E_{it}}$ is a vector of initial conditions, ε_{it} is the error term, α_i and β_i are estimated parameters (i = 1, 2, 3, …,n), (j = A, I & S) and mainly represent elasticity of poverty with respect to the variable name.

In line with the study hypothesis, the coefficients of the share-weighted growth rates of sectors j, IQ_{it-1}, and the interaction terms, are all expected to be negative. Increases in the share-weighted growth rate of a sector and in institutional quality are expected to reduce poverty, and that a higher level of institutional quality would increase the rate at which share-weighted growth rates of sectors can be transformed into poverty reduction.

In contrast, the coefficient of the growth rate of the rate of inflation and initial inequality as well as the change in inequality are theoretically expected to be positive, for increased change in inequality or higher level of initial inequality or initial low-income distribution is expected to increase the rate of poverty. Consequently, the coefficient of the initial education index and/or initial life expectancy are expected to be negative as a higher initial level of the two variables contributes to poverty reduction.

3.3.3 Empirical Specification for the Nexus of Sectoral Labour Productivity, Institutions, and Poverty

Generally, the theory of single-sector neoclassical model of Solow (1956) and others (Lucas, 1988; Romer, 1986, 1990; and Grossman and Helpman, 1991) argue that two basic processes mainly contribute to EG: factor accumulation of human and physical capital, and productivity growth that accounts for increases in total factor productivity. While technological innovation and improvement in efficiency are important in the growth process, this theory considers labour productivity growth as the most important source of long-run EG. The literature reviewed in this study reveals that there is an increased call for future research to enhance the effect of sectoral labour productivity growth on growth and PR. In response to this call, it is clear in literature that it requires addressing the fundamental challenge of accumulating the needed skills and institutional capacities to generate sustained productivity growth (Rodrik, McMillan, and Sepulveda, 2016). This study thus attempts to develop and use a specification model required to examine the extent to which high IQ can influence the translation of changes in sectoral labour productivity growth into PR.

The model framework is built on equation (1) as re-written below,

$$\Delta \text{In}P_{it} = \alpha_i + \beta \Delta \text{In}y_{it} + \varepsilon_{it}$$

The starting point of the model is built on Equation (1), the basic model of the related literature above, and following others (Benfica & Henderson, 2021; Erumban and de Vries, 2021; and Gutierrez et al., 2007) to establish the relation between rate of change of poverty and the rates of change of both labour productivity and labour force employed in population (number of workers in the country’s total population).

This is obtained by decomposing GDP per capita growth, y_{it}, into aggregate labour productivity, ($y^L_{it} = \frac{Y_{it}}{L_{it}}$), and labour force participation or employment expansion, ($\theta_{it} = \frac{L_{it}}{N_{it}}$) as follows,

$$y_{it} = \frac{Y_{it}}{N_{it}} = \frac{Y_{it}}{L_{it}} * \frac{L_{it}}{N_{it}} = y^L_{it} * \theta_{it} \qquad (8)$$

Consistent with Benfica & Henderson (2021) the sectoral form can be obtained as follows:

$$y_{it} = \sum \frac{Y_{jit}}{Lji_t} * \frac{L_{jit}}{N_{it}} = \sum y^L_{jit} * \theta_{jit} \qquad (9)$$

Where, j represents growth compositions, mainly agricultural (A), industry (I), and services (S) components.

Following Benfica & Henderson (2021), the approximate total changes of y^L_{it} and θ_{it} from equation (8) is given by,

$$\Delta \ln y_{it} = \Delta \ln y^L_{it} + \Delta \ln \theta_{it} \qquad (9a)$$

and that the total change of sectoral value added per capita is as follows:

$$\Delta \ln y_{jit} = \Delta \ln y^L_{jit} + \Delta \ln \theta_{jit} \qquad (10)$$

Drawn from Benfica & Henderson (2021), the total change in GDP per capita (ΔIny_{it}) can be presented in its sectoral form as follows:

$$\Delta Iny_{it} \approx H_A \Delta lny_{Ait} + H_I \Delta lny_{Iit} + H_S \Delta lny_{Sit} \qquad (11)$$

where y_{Ait}, y_{Iit}, and y_{Sit}, respectively represent value added per capita in the agriculture, industry, and services sectors; and $H_A = \frac{Y_{Ait}}{Y_{it}}$, $H_I = \frac{Y_{Iit}}{Y_{it}}$, and $H_S = \frac{Y_{Sit}}{Y_{it}}$ indicate the shares of Agriculture (H_A), Industry (H_I), and Services (H_S) sectors respectively in GDP.

Thus, substituting equation (10) into equation (11) gives,

$$\Delta Iny_{it} \approx H_A(\Delta \ln y^L_{Ait} + \Delta \ln \theta_{Ait}) + H_I(\Delta \ln y^L_{Iit} + \Delta \ln \theta_{Iit}) + H_S(\Delta \ln y^L_{Sit} + \Delta \ln \theta_{Sit})$$

$$\approx \sum_j H_j \Delta \ln y^L_{jit} + \sum_j H_j \Delta \ln \theta_{jit} \qquad (12)$$

Substituting equation (12) into equation (1) gives

$$\Delta InP_{it} = \alpha_i + \sum_j \beta_j H_j \Delta \ln y^L_{jit} + \sum_j \beta_j H_j \Delta \ln \theta_{jit} + \varepsilon_{it} \qquad (12a)$$

Following the theoretical hypotheses that the extent to which EG, including its composition, transforms into other socio-economic outcomes (reductions in poverty and inequality) is influenced by the quality of institutional environment (Alence, 2004; Szirmai, 2005; & 2008; Bluhm and Szirmai, 2012; and Fosu, 2022), and as adopted in section **3.3.2** above, this study also assumes the sectoral labour productivity growth elasticities of poverty (β_j) to vary linearly with initial institutional quality (IQ_{it-1}) as below:

$$\beta_j = k(IQ_{it-1}) = \beta_{1j} + \beta_{2j} IQ_{it-1} \qquad (12b)$$

Where k is a “transference” function, which represents the transformation of each sectoral LPG component of EG into PR; and IQ_{it-1} is a measure of institutional quality to influence the transformation process.

Substituting equation (12b) into (12a) and accounting for individual effect of IQ as well as the control variables captured in equation (7) above gives

$$\Delta \ln P_{it} = \alpha_i + \sum_j \beta_{1j} H_j \Delta \ln y^L_{jit} + \sum_j \beta_{2j} H_j \Delta \ln y^L_{jit} * IQ_{it-1} + \sum_j \beta_{3j} H_j \Delta \ln \theta_{jit} + \beta_4 IQ_{it-1} + \beta_5 \Delta \ln Gini_{it} + \beta_6 \mathbf{E}_{it} + \varepsilon_{it} \quad (13)$$

Where all the identified variables, including the initial condition variables are maintained, and β_i are estimated parameters (i = 0,1,2,3, …, n) and (j = A, I & S) for the different explanatory variables of interest and other control variables included. Also, β_i represents the elasticity of poverty with respect to the associated variable. θ_{jit} is the size of the sector’s labour force in per capita terms.

3.3.4 Empirical Specification for the Nexus of Structural Transformation, Institutions, and Poverty

It is emphasised in literature that the single-sector neoclassical model largely focuses on capital accumulation to describe the whole economy (Solow, 1956; Lucas, 1988; and Romer, 1986, & 1990). However, other theoretical literature (Lewis, 1954; Fei and Ranis; 1964; and Kaldor, 1966) put forward the theory of structural dualism, arguing that an economy operates on two-sector models, the traditional (agriculture) and modern (industry/manufacturing and services) sectors and where growth and poverty alleviation depend on the allocation of labour across these sectors. The literature revealed that the different economic activities within sectors and then influencing workers to move from agriculture to industry or services sector create changes in labour productivity, which allows for structural transformation to occur.

While continuously emphasised the importance of Structural Transformation for economic development and PR, findings from literature reviewed in this study show that there is need to enhance structural transformation and its effect on growth and PR. However, others (Rodrik, McMillan, and Sepulveda, 2016) have argued that one of the possible ways such need can be fulfilled is by addressing the fundamental challenge of accumulating the needed skills and institutional capacities to generate sustained productivity growth, and the structural transformation challenges to ensuring that resources flow rapidly to the modern economic activities that operate at high levels of economic productivity. On that note, this study therefore attempts to develop and use a specification model required to examine the extent to which high IQ can influence the translation of the components of structural transformation, namely structural change and sector productivity growth into PR.

The model framework is also built on equation (1) as re-written below,

$$\Delta \ln P_{it} = \alpha_i + \beta \Delta \ln y_{it} + \varepsilon_{it}$$

To obtain structural transformation term and examine its effect on poverty, we build on equation (9a) following Benfica & Henderson (2021) given by

$$\Delta \ln y_{it} = \Delta \ln y_{it}^{L} + \Delta \ln \theta_{it}$$

Now, the growth rate of average labour productivity term ($d\ln y_{it}^{L}$) in the above equation is decomposed into two components of employment expansion due to structural transformation and productivity growth. So, considering the sectoral effect, the economywide labour productivity, y^L, then becomes,

$$y^L = \frac{Y}{L} = \sum_j \frac{Y_j}{L_j} * \frac{L_j}{L} = \sum_j y_j^L * \omega_j \quad (14)$$

Where Y is the level of total output/value-added, L is the aggregate labour force (number of workers), Y_j is the level of output/value-added in sector j, L_j is the labour force in sector j, $y_j^L = \frac{Y_j}{L_j}$ and $\omega_j = \frac{L_j}{L}$ are respectively the level of labour productivity and the share of labour employed in sector j, and j = A (agriculture), I (industry/manufacturing), & S (services).

Following McMillan and Rodrik (2011, & 2014), the change in aggregate labour productivity from Equation (16) is as follows:

$$\Delta y^L \approx \sum_j \Delta\omega_j y_j^L + \sum_j \Delta y_j^L * \omega_j$$

In terms of relative change, and following Foster-McGregor and Verspagen (2016):

$$\Delta \ln y^L \approx \frac{\Delta y^L}{y_0^L} \approx \sum_j \frac{\Delta y_j^L}{y_0^L} * \omega_j + \sum_j \Delta\omega_j \frac{y_j^L}{y_0^L}$$

$$\Delta \ln y^L \approx \frac{\Delta y^L}{y_0^L} \approx \sum_j \frac{(y_{jt}^L - y_{j0}^L)}{y_0^L} * \omega_{j0} + \sum_j (\omega_{jt} - \omega_{jt0}) * \frac{y_j^L}{y_0^L} \quad (15)$$

On the right-hand side of Equation (15), the first term, $\sum_j \frac{(y_{jt}^L - y_{j0}^L)}{y_0^L} * \omega_{j0}$, is the weighted sum of productivity growth within individual sectors, where the weights are the employment share of each sector at the beginning of the period in total employment. The term captures within-sector productivity growth changes with sectoral labour productivity levels in the final(t_1) and initial(t_0) periods, respectively, which is possibly due to increased accumulation of human and physical capital within the sector j. The second term, $\sum_j (\omega_{jt} - \omega_{jt0}) * \frac{y_j^L}{y_0^L}$, captures the productivity effect of labour reallocations across different sectors, which results into the inner product of productivity levels at the end of the period with changes in the final(t_1) and initial(t_0) employment shares in sector j in total employment, which result into movement of workers between sectors, mainly from low to high productivity sectors with high potential to boost the economy-wide productivity. The second term is called structural transformation term, which has been used in empirical work by McMillan and Rodrik (2011 & 2014) and others (Busse et al., 2019; Karimu, 2019; Fox et al., 2017; Ssozi and Bbaale, 2019; Diao et al., 2019, and Gupta and Gupta, 2020; Hasan et al., 2015; and Page and Shimeles, 2015).

Substituting equation (15) into equation (9a) and then into equation (1)

$$\Delta \text{InP}_{it} = \alpha_i + \sum_j \beta_j \{\frac{(y_{jt}^L - y_{j0}^L)}{y_0^L} * \omega_{j0}\} + \sum_j \beta_j \{(\omega_{jt} - \omega_{jt0}) * \frac{y_{jt}^L}{y_0^L}\} + \beta \Delta \ln\theta_{it} + \varepsilon_{it} \quad (16)$$

Similarly, following the theoretical hypotheses in literature (Alence, 2004; Szirmai, 2005; & 2008; Bluhm and Szirmai, 2012; and Fosu, 2022) adopted in **sections 3.3.2** and **3.3.3** above, this study again assumes the structural change and sector productivity growth elasticities of poverty (β_j) to vary linearly with initial institutional quality (IQ_{it-1}) as below:

$$\beta_j = k(IQ_{it-1}) = \beta_{1j} + \beta_{2j} IQ_{it-1}$$

Where k is a "transference" function, which represents the transformation of each sectoral LPG component of EG into PR; and IQ_{it-1} is a measure of institutional quality to influence the transformation process.

Substituting β_j for each of structural transformation and within sector productivity growth into equation (16) and accounting for individual effect of IQ as well as the control variables captured in equation (7) above gives

$$\Delta \text{InP}_{it} = \alpha_i + \sum_j \beta_{1j} \{\frac{(y_{jt}^L - y_{j0}^L)}{y_0^L} * \omega_{j0}\} + \sum_j \beta_{2j} \{(\omega_{jt} - \omega_{jt0}) * \frac{y_{jt}^L}{y_0^L}\} + \sum_j \beta_{3j} \{\frac{(y_{jt}^L - y_{j0}^L)}{y_0^L} * \omega_{j0}\} * IQ_{it-1} +$$
$$\sum_j \beta_{4j} \{(\omega_{jt} - \omega_{jt0}) * \frac{y_{jt}^L}{y_0^L}\} * IQ_{it-1} + \beta_5 \Delta \ln\theta_{it} + \beta_6 \Delta \ln Gini_{it} + \beta_7 \mathbf{E_{it}} + \varepsilon_{it} \quad (17)$$

Where all the identified variables, including the initial condition variables are maintained, and β_i are estimated parameters (i = 0,1,2,3, …, n) for the variables included, and β_i represent the elasticity of poverty with respect to the associated variable.

In line with the study hypothesis, the coefficients of the growth rate of all the sectoral composition terms, institutional quality, and the interaction terms of institutional quality and the sectoral components of growth, are all expected to be negative. This is because, increases in the sectoral components of growth and institutional quality, as well as improvement in education and life expectancy are expected to reduce poverty, and that a higher level of institutional quality would increase the rate at which the sectoral components of growth can be translated into PR. In contrast, the coefficients of initial inequality and the growth rate of inequality, as well as the rate of change of inflation are theoretically expected to be positive, because a worsening inflation or income distribution results in high inflation or high inequality and so expected to increase the rate of poverty.

3.3.5 Data Issues and Instrumentation

The coverage, availability, and accessibility of data for examining the outcomes of economic development such as economic growth, poverty, human development, and living standards in developing countries are generally perceived to have increased globally and across regions. However, literature has consistently revealed evidence of a wide-ranging data quality concerns among academics and development practitioners for research and evidence-based policymaking (Ravallion et al., 1991; Ravallion, 1995; Chen and Ravallion, 2010; Young 2012; Devarajan, 2013; Jerven 2013; Harttgen et al., 2013; Pinkovskiy and Sala-i-Martín 2014; Beegle et al, 2016; and McMillan et al., 2017). In developing regions, especially Sub-Saharan Africa, some of the critical issues highly debated among scholars include the irregular generation of data that is often of poor-quality, and the rudimentary methodological approaches used in generating the data due to constraints and limited support to national statistics institutions. A detailed discussion of evidence on these data issues is well presented in **section 2.2.4** of this thesis report.

The issues are known to commonly contribute to endogeneity, an econometric problem that usually affects the causal or predictive ability of the independent variables to systematically explain the dependent variables. As a result of these problems, the key explanatory variables of interest used in this study, mainly IQ and measures of the sectoral compositions of EG, are likely to be endogenous. While attempts are being made to address endogeneity issues to identify the causal effects of the measures of these IQ and EG parameters on PR, some studies have often ignored the problems. In line with other studies (Ravallion and Chen, 2007; Loayza and Raddatz, 2010; Christiansen and Toddo, 2014; and Pham and Riedel, 2019), this study employs Two-Staged Least Squares (2SLS) estimation techniques to address potential endogeneity problems and to account for both observed and unobserved effects.

Accordingly, potential instruments were identified in literature for IQ including Absolute Latitude, Log of settler mortality, Legal origin, and Ethnic Fractionalization index, and for the dimensions of the composition of growth including measures of average/mean annual rainfall/precipitation and temperature, logarithm and annualised log change in commodity terms of trade and its export and import prices, and the lagged values of the measures of these growth compositions. Such instruments tend to share the three common properties for validity including: high/significant correlation with the endogenous variable, uncorrelated with the error term, and only impact the dependent variable through the endogenous variable. Based on tests for endogeneity and instrument validity, Absolute Latitude was selected among others as the usable instrument for IQ, while lagged values of the growth compositions were selected for the respective growth parameters among other instruments. This is mainly because of their strength in satisfying the above criteria for good instruments and data availability for the period of study and sample countries included in the study.

Analyses and discussion of results from the DWH tests for endogeneity and tests for instrument validity and relevance from the first-stage regressions are presented in **section 3.4.2.4** of this thesis report. Also, detailed descriptions of the selected Absolute Latitude and the lagged values of the measures of growth compositions and the respective theoretical and conceptual explanations for which they are assumed to meet exclusion restrictions are presented in **section 2.3.3** of this thesis report.

3.3.6 Data Set and Variable Descriptions

The data set consists of data on variables for measures of poverty, EG, sectoral components of EG, IQ, employment, population, inequality, and control and instrumental variables of interest. For this paper, the description of the data set is limited to the variables captured in the analytical framework/model(s). The data is obtained from different sources for the period 1990–2018 on 51 developing economies (low- and middle-income countries) with 18 countries from SSA. This study period largely accounts for the recent impressive growth boom in many SSA countries. Other regions include 4 countries in the Middle East and North Africa (MENA), 8 in Latin America and Caribbean (LAC), 5 in South Asia (SA), 1 in Europe and Central Asia (ECA), and 10 in East Asia and Pacific (EAP).

By defaults, regression analysis created exception in cases where the choice of selection of a country was limited by the lack of data on measures of poverty (poverty spells) and other key model variables of interest. Obtaining data from across developing regions for the period covered in this study allowed for the comparative analysis of the sectoral patterns of growth and the poverty-reducing effect of sectoral components of growth in SSA with those in other regions.

The study used growth and employment data from the Groningen Growth and Development Centre (GGDC). The GGDC database covers different sub-sectoral components of economic growth, which are categorised into the three main sectoral economic activities that together account for total economic growth measured in Gross Domestic Product (GDP), namely Agriculture (including farming, forestry, fisheries, and hunting), Industry (including manufacturing, mining, public utilities, and construction), and Services (including transportation, trade, business services, finance, real estate, government services, and other services). This dataset was mainly chosen for this study because it allows for a rich description of the sectoral patterns of growth including trends in sectoral shares of value added and employment, as well as in aggregate labour productivity growth and its corresponding components, structural change, and within-sector productivity.

Despite the dataset containing only 18 SSA countries, McMillan and Zeufack (2022) and Erumban and de Vries (2021) revealed that at that time, these countries were representative of SSA in terms of growth dynamics. For instance, they argue that the 18 SSA countries include the two highly populated countries, Ethiopia, and Nigeria; the two richest countries, Botswana and Mauritius (measured using GDP per capita in 2018); and two of the poorest countries in SSA, Malawi and Mozambique.

The study utilizes data on internationally comparable monetary poverty measures, mainly two poverty headcount measures, \$1.90 and \$3.20 per day (2011 PPP) poverty headcounts for low- and middle-income countries respectively. The data is obtained from the World Bank PovcalNet or Poverty Platform database. A detailed description of these measures and the reason for their selection is provided in **section 2.3.4** of this thesis report. Following others (Benfica and Henderson, 2021; and Erumban and de Vries, 2021), poverty spells were constructed with a duration of at least five years from irregular national survey-based poverty data across countries and utilized to address econometric problems while estimating the model parameters.

As employed in the previous empirical chapter (chapter 2) of this thesis, the study used, as measures of institutions, the six governance institutional quality indicators obtained from the World Bank Worldwide Governance Indicators (WGI) database (Kaufmann et al., 2019). These institutional quality indicators, include Voice and Accountability (VA), Political Stability and absence of Violence (PSV), Control of Corruption (CC), Rule of Law (RL), Regulatory Quality (RQ), and Government Effectiveness (GE). In addition to obtaining data on these indicators from different sources and sufficient and consistent availability of the data across many countries around the world for the period covered in this study, a detailed description of these measures and the reason for their selection is provided in **section 2.3.4** of this thesis report.

While the current study literature review strongly pointed to inequality as a major constraint dampening the poverty-reducing effect of aggregate and sectoral growth, data on Gini-coefficient/index as a measure of inequality to control for changes in the distribution of income. In addition to data obtained from various sources on instrumental variables (IVs) for measures of growth and IQ, other control variable for human capital (life expectancy at birth) is also captured in the dataset. A detailed description of the types of variables and the respective sources with the corresponding measurements can be found in **Appendix 5A**.

3.3.7 Analysis and Estimation Techniques

The study employed the Two-Stage Least Squares (2SLS) estimation method. Generally, the national survey-based poverty data is not generated in an irregular pattern in most developing countries. So, the direct application of POLS estimation on such irregular data can neglect the dual nature of time-series and cross-sectional data and assumes a model of constant coefficients across time and cross-section (Gujarati, 2015). In line with others (Ravallion and Chen, 1997; Loayza and Raddatz 2010; Benfica and Henderson, 2021; and Erumban and de Vries, 2021), the study constructed and used spells to mitigate such econometric anomaly and to avoid some of the difficulties faced in level comparisons. Indeed, there are concerns that over time countries often improve/change the measurement methodologies of their household surveys, which affect the comparability of poverty estimates between the two years of poverty spell (Erumban and de Vries, 2021; and Ravallion and Chen, 1997). However, the study regression procedures excluded poverty spells with break that potentially would have affected the comparability of poverty estimates, by constructing poverty spells with a duration of at least five years to enhance the data set for estimations that allowed the analysis to address econometric problems.

Since pooled OLS is assumed inadequate to addressing endogeneity problems, this study follows empirical work of others (Ravallion and Chen, 2007; Loayza and Raddatz, 2010; Christiaensen and Todo, 2014; and Pham and Riedel, 2019) that employed Two-Stage Least Square (2SLS) estimation. Provided in literature (Gujarati, 2015; Hill et al., 2018; Wooldridge, 2020; Hong, 2020; & Stock and Watson, 2020), IVs accounts for the potential endogeneity issues likely caused by omitted variable bias, reverse causality, and measurement errors in explanatory variables of interest. Hence permitting the possibility of making inferences with the data used and to account for both observed and unobserved effects.

For multiple endogenous variables (institutional quality, each of the sectoral growth components, and structural transformation and productivity growth) and the corresponding interaction terms contained in the empirical analysis models, the study followed literature on appropriately employing the use of multiple instruments (Baum, 2006; Cameron and Trivedi, 2009; Adkins & Hill, 2011; Gujarati, 2015; Hill et al., 2018; Wooldridge, 2020; & Stock and Watson, 2020). The sources argued that employing multiple instruments must require at least as many instrumental variables as there are endogenous variables. Details on theoretical and empirical analysis evidence on tests for endogeneity and validity of instruments are provided in **section 3.4.2.4** of the thesis. Additionally, the study employed the use of robust standard errors to control for heteroskedasticity and serial correlation (Gujarati, 2015; & Wooldridge, 2020).

In line the previous chapter (Chapter 2) of this thesis, and as a way of avoiding the limitations on the forms of institutions to use among the diverse sets that matter for the components of growth and development, this study in line with others (Zhuang et al., 2010; Perkins et al., 2013; and Torvik, 2020) used a mutually reinforcing broad cluster of institutional quality (IQ) dimensions. These sources defined a broad cluster of institutional quality as one that is representative of a combination of economic, political, social, and legal institutions and policies that matter for increased, sustained, and inclusive EG and improved development outcomes.

Following previous literature (Knack and Keefer, 1995; Easterly and Levine, 2003; Le et al., 2015; Siyakiya, 2017; Doumbia, 2019; and Alonso et al., 2020) and in line with detailed discussions provided in section 2.3.4 of this thesis report on the type of IQ used and reasons for selection, this study constructed a weighted average IQ index using the Principal Components Analysis (PCA). This is because the different institutional dimensions of the World Governance Indicators (WGI) used for IQ are strongly correlated with one another and all appear to measure broad governance concepts (Ouedraogo et al., 2022; Qamruzzaman et al., 2021; Nawaz et al., 2014; and Langbein and Knack 2010). Hence the study employed the use of the weighted average IQ index and each of the WGI indicators one at a time to avoid high multicollinearity problems. In addition to using the weighted average IQ index, and as robustness checks, this study further used the Six WGI indicators independently and compared the results obtained with the weighted IQ index.

Appendix 5B2 presents PCA results for the different dimensions of governance institutions used to generate the main IQ index in this study sharing the common characteristics of all the dimensions. As shown in Appendix 5B2, the index of IQ largely shares common features of the six World Governance Indicators represented in the one main extracted factor with eigenvalue 4.63542, which is to be retained. This aligns with the Kaiser Criterion (Kaiser, 1974) of eigenvalue greater than one (≥1) for components to be retained. There is also evidence of all the potential components to explain all variances in all variables as revealed by the Rho value = 1.000 in Appendix 5B2 from the principal components' correlation analysis, and by each of the unexplained variance being zero from the eigenvectors analysis. To show appropriateness of the use of PCA, Appendix 5B2 reveals the Kaiser-Meyer-Olkin (KMO) statistics for the measure of sampling adequacy to be above the threshold value of 0.50 for the overall KMO statistic and for each of the variables. Moreover, the eigenvalue of the main factor component is greater than one, showing 77.26% of the variance are captured with all the six indicators loaded strongly on this factor. To further ascertain these results, the Horn's (1965) robust adjusted eigenvalue criterion parallel analysis was performed to decide on the number of factors to extract after adjusting the original eigenvalues for sampling error-induced collinearity among the variables. Like the Kaiser criterion, the result also shows one extracted factor to be retained with adjusted eigenvalue greater than 1.

For Mooi et al. (2018), the 77.26% explained variance means there is a 22.74% to be accounted for. As a result, the study analyses the independent and interactive moderating effects of the six governance indicators individually (as each may represent different institutional dimensions of political, economic, social, legal, or a combination). Thus, as robustness check, this study further used the six WGI indicators independently and compared the results obtained with the average weighted IQ index.

The regression results are analysed and discussed at global/cross-regional sample level to compare results across regions, and at regional cross-country level sample for SSA economies at both $1.9 and $3.2 per day poverty headcounts. The analyses test the hypotheses on whether the impact of the growth rates of sectoral components of growth and the level of initial institutional quality index (IQ_{t-1}) in SSA are different from other regions. It also tests whether IQ_{t-1} through interaction positively influences the translation of sectoral growth components into PR in SSA relative to other regions. Results are presented separately by type of sectoral compositions of EG, mainly; sectoral value-added, sectoral labour productivity, and structural change and within-sector productivity growth components.

The first set of models, which correspond to Equations (7), (13), and (17) of the empirical model specification frameworks in **sections 3.3.2, 3.3.3, and 3.3.4** respectively with non-regional dummy and non-IQ_{t-1} terms, present the basic global view of estimating the effects of independent sectoral value-added and labour productivity growth, as well as structural change and sector productivity growth components of EG on poverty.

The second set of models also correspond to Equations (7), (13), and (17) of the empirical model specification frameworks in **sections 3.3.2, 3.3.3, and 3.3.4** respectively with regional dummies but non-IQ_{t-1} terms, presents the basic view in addition to systematically controlling for the interaction of regional dummies with sectoral growth components. The regional dummies are constructed to determine whether the elasticities of poverty with respect to sectoral growth components differ between SSA and other regions across the world.

The third and fourth sets of models respectively replicate the first and second sets of models, which take the actual global view corresponding to Equations (7), (13), and (17), of the empirical model specification frameworks in **sections 3.3.2, 3.3.3, and 3.3.4** respectively accounting for IQ_{t-1} and its terms of interaction with the sectoral growth components. Models five and six, which are at the cross-country sample level that focuses on analysis for SSA, respectively replicate the first and third models without regional dummies but instead limited to the SSA region.

3.4 Empirical Results and Discussions

3.4.1 Descriptive Statistics

A detailed descriptive statistical analysis of key variables is revealed in Appendix 2D for minimum available samples at global level and across regions for countries included in the analysis. It is revealed that the mean levels of poverty headcounts at $1.90/day and $3.20/day are respectively 0.1740 and 0.3321 and range from minimums of 0.00 (no poor) for the $1.90/day headcount and 0.0022 (some evidence of poor) to maximum of 0.8623 (largely poor) and 0.9631 (almost all poor) for $3.20/day respectively. Regional analyses indicate that the lowest mean level of poverty headcount at $1.90/day and $3.20/day is observed in Europe and Central Asia (ECA) at 0.0106 and 0.0576 (somehow less poor) respectively, while the largest mean level of poverty headcount at $1.90/day and $3.20/day is observed in Sub-Saharan Africa (SSA) at 0.4674 and 0.6852 (evidence of poor) respectively.

It can be seen in Appendix 2D that the average level of institutional quality (IQ) in the global sample is -0.0459. This generally appears to spread across regions with relatively low level of IQ environment in South Asia (SA) (-0.7507), SSA (-0.1998) and East Asia and Pacific (EAP) (-0.0886) in that order, while other regions appear to have relatively much better IQ environment as seen in Middle East and North Africa (MENA) (+0.1919), Latin America and Caribbean (LAC) (+0.1300), and ECA (+0.0804).

On the experience of sectoral value-added growth, Appendix 2D reveals that the level of services value-added growth appears to perform better on a global scale at an average growth level of $5280 Billion compared to industry value-added growth at $3560 Billion and agriculture value-added growth at $434 Billion. Such similar trends follow for services value-added growth in the lead across all regions, with the largest relatively performing value-added growth level for all the three sectors being observed, on average, in EAP (services - $19900, industry - $14300, and agriculture - $1730 all in Billions) while the least for the respective sectors are found in MENA (services - $14.80, industry - $3.31, and agriculture - $0.489 all in Billions).

For the level of sectoral labour productivity growth, Appendix 2D shows that services labour productivity growth appears to globally perform better at an average growth level of $98018.89 per labour employed than industry and agriculture labour productivity growth at respectively $98018.89 and $61160.43 per labour employed. Across regions, EAP appears to, on average, perform relatively better on the level of all sectoral labour productivity growth (services at $323585.40, industry at $188956.50, and agriculture at $59488.12 all in per labour employed). Closer to EAP is such relative performance seen to be consistently followed for all sectoral labour productivity growth in LAC (services at $52818.29, industry at $30414.26, and agriculture at $3198.517 all in per labour employed). However, the least level of average labour productivity growth is observed in SSA at the level of $-5081.39 per labour employed for services, MENA at $487.02 per labour employed for industry, and in ECA at $58.96 per labour employed for agriculture.

In the case of sectoral components for structural change and productivity growth, structural change appears to perform relatively less in the global sample at an average level of 0.007 units compared to productivity growth at a relatively better growth level of 0.0155 units. Across regions, structural change leads in SSA and SA at 0.0135 and 0.0105 units respectively, while productivity growth appears to perform much better in EAP, SA, and MENA in that order.

3.4.2 Regression Results

3.4.2.1 OLS Results on Sectoral Value-added Growth

In Table 2.1a, column 1 presents findings for regression models without IQ at the $1.90/day poverty headcount. Results show that the services and agriculture value-added growth elasticities of poverty are negative and statistically significant in the global sample model with non-regional dummies. The findings reveal that one percent increases in services and agriculture value-added growth contribute to 2.1% and 1.6% reductions in extreme poverty respectively. These results are consistent with findings from other studies (Ravallion and Datt,1996; Chuhan-Pole et al., 2014; Cadot et al., 2016; and Dorosh and Thurlow, 2018) which also find that services and agriculture value-added growth have negative and statistically significant relationships with poverty.

In column 2 of Table 2.1a, which presents results for non-IQ global sample regression model with regional dummies, findings show that the services value-added growth elasticity of poverty is negative and statistically significant in East Asia and Pacific (EAP), South Asia (SA), and Sub-Saharan Africa (SSA). In these cases, a one percent increase in services value-added growth contributes to 1.5%, 5.1%, and 5.2% reductions in poverty in EAP, SA, and SSA respectively. The agriculture value-added growth elasticity of poverty is also negative and statistically significant in Europe and Central Asia (ECA) (-83.2), Middle East and North Africa (MENA) (-11.8) and Latin America and Caribbean (LAC) (-7.8). However, industry value-added growth elasticity of poverty is only negative and statistically significant in ECA (-11.5). The findings are again generally in line with others (Hasan and Quibria, 2004;

Ravallion and Chen, 2007; Suryahadi et al., 2009; Montalvo and Ravallion, 2010; de Janvry and Sadoulet, 2010, Diao et al., 2007 & 2010; Christiaensen et al., 2011; and Pham and Riedel, 2019) who found agriculture value-added growth as the major driver for PR, and for those (Ferreira et al., 2010; and Chuhan-Pole et al., 2014) who found services value-added growth as the strongest determinant of PR in developing countries.

With the exception of Europe and Central Asia, observations across columns 1 and 2, and across regions, generally show the lack of statistically significant poverty-reducing effects of manufacturing/industry value-added growth. Indeed, while structural transformation should in theoretical terms generally be associated with movement of shares of both value-added and labour employed from low productivity sector (agriculture) to high productivity sector, especially the manufacturing/industry sector, evidence in this study reveals some kind of contrary views.

As presented in **Appendix 2E**, there is clear evidence observed across regions on the reduction in average shares of both real value-added and labour employed in agriculture and the corresponding increase in the shares of these dimensions for services, instead of manufacturing/industry over the study period. There seems to be stagnation in the movement of real value-added and employment shares to the manufacturing sector, which might be the reason for the statistically insignificant contribution of the manufacturing /industry sector to PR at global and across regions. Theoretically, such direct movement of average shares of real value-added and employment to the services sector without going through the manufacturing sector has been referred to in literature as pre-mature structural transformation or de-industrialization, which is typical of characteristics likely to affect the poverty reducing effect of industry and structural transformation as a whole.

For instance, while theory emphasised the importance of structural transformation for rapid PR, observation in this study shows that the increased real value-added and employment shares from agriculture into the services sector in SSA over the years as presented in **Appendix 2E** appear to have minimally contributed to PR in the region. This aligns with sources (Chuhan-Pole, 2014; and Berardi and Marzo, 2017) revealing the substantial contribution of the manufacturing/industry sector to the impressive growth in SSA, but argued that it stagnated shares of real value-added and labour employed has hence limited its contributions to PR.

Some other evidence argues that while manufacturing/industry has a higher rate of technology transfer with a higher potential for productivity catch-up, the employment absorption in the non-agricultural sectors is mainly concentrated in the informal and weak productivity services sector. The transformation is dominated by high shares of vulnerable employment from the low-productivity agriculture sector into low-productivity informal services sector, mainly the household enterprises in the trading and personal services sectors that have limited potential for international markets. These have constrained the positive contribution of structural change to average labour productivity growth in Africa, which is the major link between growth and poverty (Mcmillan & Rdrik, 2011; De Vries et al, 2015; Page and Shimeles, 2015; Fox et al, 2017; Diao et al., 2019; Adegboye & Ighodaro, 2020; Erumban and de Vries, 2021; & Benfica and Henderson, 2021). These same sources and Berardi and Marzo (2017) argued that although the composition of growth and its overall intensity remains important for PR, there is limited exploitation of the extractive primary commodity exports natural resources to promote economic diversification in the commodity-driven growth sectors that currently lack pro-poor potential in most African economies. Hence, a stagnated or declining share of the labour force in the high-productivity manufacturing sector. In addition to the dismal initial conditions in terms of per capita income, and social development, the concentration of growth in commodity exports is not conducive to PR in Africa. Regardless of these opportunities, they argued that establishment of the high value-addition productivity extractive industries are very capital-intensive and require infrastructure, human capital, technical innovations, and the level of private sector investment and participation that is lacking in Africa. Moreover, the extractive industry sector has limited backward spillover linkage with other sectors in terms of supply chain or demand for locally produced goods and services (Chuhan-Pole, P., 2014).

For model 2, which corresponds to equation 7 of the study specification framework with IQ terms, columns 3 and 4 of Table 2.1a present analysis of the effect of the terms of interaction between the measures of value-added growth and institutional quality (IQ). Focusing on column 3 in a non-regional dummy global sample regression, there is a positive and statistically significant effect of IQ on poverty. A detailed discussion on the intuitive reasons for such significant positive effect of IQ on poverty has been presented earlier in **section 2.4.3.3** of this thesis report. Specifically, this is broadly linked with the Kuznets (1955) theoretical hypothesis on the relationship between economic inequality and the level of development measured in GDP per capita growth coupled with the role played by institutional reforms at initial stage of development. In support of Kuznets (1955), detailed evidence-based explanations are provided by others in the (Khan, 2007; Acemoglu and Robinson, 2012; and Weil, 2013) in **section 2.4.3.3.**

However, the coefficients of the terms of interaction between IQ and each of services and agriculture value-added growth are as expected negative and statistically significant. This indicates that the effect of services or agriculture value added growth on PR depends on the level of IQ in the global sample. For interpretation of the coefficients of the terms of interaction with respect to poverty, this study uses the marginal effect analysis of the growth rate of sectoral value-added composition of EG and IQ to examine the interaction effects on poverty at different percentile levels of IQ. Table 2.1b below presents the results of the analysis. The table reveals that at the $1.90/day poverty headcount, both services and agriculture value-added growth significantly reduce poverty. This effect on PR occurs at all levels of IQ (percentile values) and is larger (higher magnitude of negative value) in a high IQ environment.

For the marginal effects of services and agriculture value added growth to be dependent on IQ, the expressions, based on column 3 of a non-regional dummy global sample regression in Table 2.1a, are given by:

$\frac{\partial(Pov.rt)}{\partial(SVAgrt)} = -1.950 - 1.358\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(AVAgricgrt)} = -4.582 - 3.014\ (IQ)$

Note: *Pov.rt = Rate of poverty; AVAgrt. = Agricultur value-added growth; SVAgrt. = Services value-added growth*

IQ takes different percentile values, and the values -1.950 and -4.582 are respectively the conditional effects of services and agriculture value-added growth. Also, the values -1.358 and -3.014 are respectively the marginal effects of strengthening IQ for services and agriculture value added growth. In Table 2.1b, the effects of the terms of interaction between IQ and each of services and agriculture value-added growth on extreme poverty are shown to range from -0.184 (10^{th} percentile) to -5.569 (99^{th} percentile) for services value added growth, and from -0.663 (10^{th} percentile) to -12.614 (99^{th} percentile) for agriculture value added growth. This influence of IQ on the contributions of agriculture and services value-added growth to PR is largely due to the rule of law, control of corruption, government effectiveness, and voice and accountability dimensions of IQ.

Column 4 of Table 2.1a presents findings of the effects of the terms of interaction between IQ and measures of sectoral value-added growth across regions from a global sample regression with regional dummies. It can be seen that while the effect of the level of IQ on extreme poverty is positive and statistically significant, the effect of the interaction between IQ and services value-added growth is as expected negative and statistically significant. Also, in column 4 of Table 2.1a, the coefficient of the terms of interaction between the level of the weighted average of IQ and each of agriculture and manufacturing/industry value-added growth is statistically insignificant. However, Appendix 4B1 on regression results for the dimensions of IQ presents a different view regarding the significant influence of key dimensions of IQ on the poverty-reducing effect of these sectoral value-added growth. In Appendix 4B1, the coefficient of the terms of interaction between voice and accountability (VA) dimension of IQ and each of agriculture and manufacturing/industry value-added growth or the coefficient of the term of interaction between the rule of law (RL) dimension of IQ and manufacturing value-added growth is negative and statistically significant.

Presented in Appendices 2F and 2G are results of the marginal effect analysis of the coefficient of the terms of interaction between the dimensions of IQ and either of services, agriculture or manufacturing/industry value-added growth at different percentile levels of IQ or VA or RL in a global sample regression with regional dummies (column 4). Appendix 2F reveals that services value-added growth significantly reduces extreme poverty at all percentile values of IQ in EAP, LAC, and SA with minimum thresholds corresponding to the 25th percentile values of IQ in MENA and SSA regions. Also, the same Appendix 2F shows that agriculture value-added growth significantly reduces extreme poverty at all percentile values of VA in EAP, ECA, LAC, and MENA, with minimum thresholds corresponding to the 25th percentile value of VA in SSA. Further evidence shows that manufacturing/industry value-added growth significantly reduces extreme poverty at all percentile values of both VA and RL in ECA, with minimum thresholds corresponding to the 25th percentile values of VA and RL in MENA and SSA.

For marginal effect of each of services, agriculture and manufacturing/industry value-added growth to be dependent on IQ or VA or RL shown in column 4 of Table 2.1a, the expressions based on the respective regressions are given in Table 2.1c. Where IQ/VA/RL takes different percentile values and like for services value-added growth results in EAP, -4.329 is the conditional effect of services value-added growth, and -1.634 is the marginal effect of strengthening IQ, and so on for other regions, sectoral growth measures, and IQ dimensions.

Table 2.1a: Results for Sectoral Value-added Growth at $1.90/day Poverty Headcount

Dependent Variable: Δlog $1.90/day poverty headcount measure, $\Delta loghc\_19_{it}$						
	Models without IQ		**Models with IQ**		**SSA Mod with/without IQ**	
Explanatory vvariables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Agriculture value-added growth	-2.112**		-4.582**		-0.0359	-0.241
	(1.069)		(2.080)		(0.737)	(1.385)
Industry value-added growth	-0.366		-0.00811		0.276	0.203
	(0.618)		(0.948)		(0.582)	(0.742)
Services value-added growth	-1.598**		-1.950**		-0.764	-0.372
	(0.661)		(0.962)		(0.593)	(1.121)
Institutional Quality (IQ)			0.0591**	0.0636**		0.0117
			(0.0233)	(0.0269)		(0.0314)
(Agriculture value-added growth) * IQ			-3.014*	-1.565		-0.00439
			(1.659)	(2.100)		(0.981)
(Industry value-added growth) * IQ			-0.620	-0.753		0.712
			(0.725)	(0.746)		(0.843)
(Services value-added growth) * IQ			-1.358**	-1.634**		-0.453
			(0.674)	(0.799)		(0.788)
Agric value-added growth*_regional dummy variable_						
East Asia and Pacific (EAP)		1.150		-13.52		
		(5.733)		(8.537)		
Europe & Central Asia (ECA)		-83.22***		-90.89***		
		(21.36)		(19.29)		
Latin America & Caribbean (LAC)		-7.800*		-1.859		
		(4.256)		(6.213)		
Middle East & North Africa (MENA)		-11.75*		-8.205		
		(5.964)		(6.606)		
South Asia (SA)		1.632		4.856		
		(4.066)		(3.489)		
Sub-Saharan Africa (SSA)		-1.079		-3.657		
		(0.969)		(2.451)		
Indust value-added growth*_regional dummy variable_						
East Asia and Pacific (EAP)		2.138		2.575		
		(1.659)		(2.803)		
Europe & Central Asia (ECA)		-11.51**		-17.89***		
		(4.661)		(2.339)		
Latin America & Caribbean (LAC)		0.612		0.981		
		(1.216)		(2.001)		
Middle East & North Africa (MENA)		2.383		-0.172		
		(4.270)		(5.853)		
South Asia (SA)		6.168**		6.959**		
		(2.845)		(2.712)		
Sub-Saharan Africa (SSA)		-0.346		-0.0950		
		(0.813)		(0.888)		
Services value-added growth*_regional dummy variable_						
East Asia and Pacific (EAP)		-5.201***		-4.329		
		(1.843)		(2.762)		
Europe & Central Asia (ECA)		12.70***		18.05***		
		(4.389)		(2.240)		
Latin America & Caribbean (LAC)		-0.992		-1.464		
		(0.985)		(1.169)		
Middle East & North Africa (MENA)		0.111		-0.883		
		(1.573)		(2.577)		
South Asia (SA)		-5.134**		-6.647***		
		(2.062)		(2.157)		
Sub-Saharan Africa (SSA)		-1.459**		-2.084*		
		(0.660)		(1.110)		
Population growth	4.377***	2.925*	5.249***	3.700**	1.720	1.788
	(1.305)	(1.532)	(1.563)	(1.840)	(1.245)	(1.526)
Change in inequality (dGini)	2.389***	2.354***	2.299***	2.589***	0.536	0.602
	(0.494)	(0.474)	(0.683)	(0.682)	(0.357)	(0.389)
Initial Gini (lnsGini)	0.0344	0.0293	0.0441	-0.0259	0.0429	-0.00252
	(0.0339)	(0.0540)	(0.0427)	(0.0630)	(0.0525)	(0.0692)
Initial life expectancy	-0.149***	-0.169**	-0.139**	-0.219**	-0.0526	-0.112
	(0.0526)	(0.0722)	(0.0646)	(0.0938)	(0.0577)	(0.0812)
Constant	0.566**	0.666**	0.514*	0.821**	0.194	0.382
	(0.236)	(0.297)	(0.290)	(0.379)	(0.221)	(0.295)
Observations	233	233	162	162	57	42
R-squared	0.296	0.395	0.335	0.443	0.175	0.279

Robust standard errors in parentheses; and (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fourth columns*

Table 2.1b: Impact of Interaction Terms on Poverty at different Levels of IQ and Sectoral Value-Added Growth Rates

Percentile	IQ Percentile Values	Analysis for Agriculture Value-added Growth and IQ at $1.90/day poverty headcount $\frac{\partial(Pov.rt)}{\partial(AVAgrt)} = -4.582 - 3.014\,(IQ)$	Analysis for Services Value-added Growth and IQ at $1.90/day poverty headcount $\frac{\partial(Pov.rt)}{\partial(SVAgrt)} = -1.950 - 1.358\,(IQ)$	Analysis for Industry Value-added Growth and IQ at $3.20/day poverty headcount $\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = -0.941 - 1.103\,(IQ)$
10^{th}P	-1.300177	-0.663	-0.184	0.493
25^{th}P	-0.783239	-2.221	-0.886	-0.077
50^{th}P	-0.201460	-3.975	-1.676	-0.719
75^{th}P	0.4337456	-5.889	-2.539	-1.419
90^{th}P	1.596501	-9.394	-4.118	-2.702
99^{th}P	2.664931	-12.614	-5.569	-3.880

Note 1: *The 10^{th}P, 25^{th}P, 50^{th}P, 75^{th}P, 90^{th}P, & 99^{th}P values used are obtained from detailed descriptive statistics.*
Note 2: *Pov.rt = Rate of poverty; AVAgrt. = Agricultur value-added growth; SVAgrt. = Services value-added growth; and IVAgrt = Manufacturing/industry value-added growth*

In Appendix 2F, the effect of the interaction between services value-added growth and IQ on extreme PR at different percentile levels of IQ ranges from -2.259 (at the 10^{th} percentile) to -8.669 (99^{th} percentile) in EAP, from -0.084 (10^{th} percentile) to -5.922 (99^{th} percentile) in LAC, from -4.178 (10^{th} percentile) to -7.138 (99^{th} percentile) in SA, from -0.023 (25^{th} percentile) to -3.821 (99^{th} percentile) in MENA, and from -0.651 (25^{th} percentile) to -5.226 (99^{th} percentile) in SSA. Similarly, the effects of the interaction between agriculture value-added growth and VA on extreme PR ranges from -1.974 (10^{th} percentile) to -12.194 (99^{th} percentile) in EAP, from -89.275 (10^{th} percentile) to -90.591 (99^{th} percentile) in ECA, from -3.343 (10^{th} percentile) to -8.919 (99^{th} percentile) in LAC, from a -1.404 (10^{th} percentile) to -8.90 (99^{th} percentile) in MENA, and from -1.173 (25^{th} percentile) to -8.007 (99^{th} percentile) in SSA. In Appendix 2G, the effects of the interaction between manufacturing/industry value-added growth and the level of either VA or RL on extreme PR ranges from -17.378 (10^{th} percentile) to -18.711 (99^{th} percentile) in ECA, from -0.308 (50^{th} percentile) to -3.649 (99^{th} percentile) in MENA, and from -0.143 (50^{th} percentile) to -2.825 (99^{th} percentile value) in SSA.

The above results indicate that the quality of institution is important for the extreme poverty-reducing effects of the various measures of sectoral value-added growth in the regional dummy global sample regressions, even though the level of significance in terms of importance is different for different dimensions of IQ. The influence of IQ and its dimensions on the poverty-reducing effect of each of the sectoral value-added growth measures get larger (higher magnitude of negative values) in high IQ dimension environment across regions including SSA. Evidence reported in Appendices 2F and 2G reveal that the influence of institutions on the contributions of sectoral value-added growth measures to PR across regions is largely due to the weighted average of IQ and its dimensions of the rule of law, control of corruption, government effectiveness, and voice and accountability.

Table 2.1c: Effects of the Interaction Between Sectoral Value-Added Growth Rates and the Level of Institutional Quality across Regions at $1.90/day Poverty Headcount Measure

Region	*Analysis of Services Value-Added Growth and index of Institutional Quality (IQ)*	*Analysis of Agriculture Value-Added Growth and Voice and Accountability (VA)*
East Asia & Pacific (EAP)	$\frac{\partial(Pov.rt)}{\partial(SVAgrt)} = -4.329 - 1.634(IQ)$	$\frac{\partial(Pov.rt)}{\partial(AVAgrt)} = -8.506 - 3.887(VA)$
Europe & Cen. Asia (ECA)	$\frac{\partial(Pov.rt)}{\partial(SVAgrt)} = 18.050 - 1.634(IQ)$	$\frac{\partial(Pov.rt)}{\partial(AVAgrt)} = -90.590 - 3.887(VA)$
Lat. America & Caribb. (LAC)	$\frac{\partial(Pov.rt)}{\partial(SVAgrt)} = -1.464 - 1.634(IQ)$	$\frac{\partial(Pov.rt)}{\partial(AVAgrt)} = -4.494 - 3.887(VA)$
Mid. East & North Afri. (MENA)	$\frac{\partial(Pov.rt)}{\partial(SVAgrt)} = -0.883 - 1.634(IQ)$	$\frac{\partial(Pov.rt)}{\partial(AVAgrt)} = -6.022 - 3.887(VA)$
South Asia (SA)	$\frac{\partial(Pov.rt)}{\partial(SVAgrt)} = -6.647 - 1.634(IQ)$	$\frac{\partial(Pov.rt)}{\partial(AVAgrt)} = 3.380 - 3.887(VA)$
Sub-Saharan Africa (SSA)	$\frac{\partial(Pov.rt)}{\partial(SVAgrt)} = -2.084 - 1.634(IQ)$	$\frac{\partial(Pov.rt)}{\partial(AVAgrt)} = -4.473 - 3.887(VA)$
	Analysis for Industry Value-Added Growth and Rule of Law (RL)	*Analysis for Industry Value-Added Growth and Voice and Accountability (VA)*
East Asia & Pacific (EAP)	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = 2.005 - 2.260(RL)$	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = 0.615 - 2.219(VA)$
Europe & Cen. Asia (ECA)	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = -17.44 - 2.260(RL)$	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = -18.710 - 2.219(VA)$
Lat. America & Caribb. (LAC)	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = -0.258 - 2.260(RL$	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = 3.947 - 2.219(VA)$
Mid. East & North Afri. (MENA)	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = 0.217 - 2.260(RL)$	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = -2.006 - 2.219(VA)$
South Asia (SA)	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = 6.216 - 2.260(RL)$	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = 5.941 - 2.219(VA)$
Sub-Saharan Africa (SSA)	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = -0.548 - 2.260(RL)$	$\frac{\partial(Pov.rt)}{\partial(IVAgrt)} = -0.808 - 2.219(VA)$

Note: *Pov.rt = Rate of poverty; AVAgrt. = Agricultur value-added growth; SVAgrt. = Services value-added growth; and IVAgrt = Manufacturing/industry value-added growth*

These findings generally align with the theoretical and empirical perspectives of good and inclusive political and economic institutions, either independent or clustered, that matter for enhancing sustained and inclusive EG (Engerman and Sokoloff, 1997, 2002; Acemoglu et al., 2001 & 2002; Acemoglu and Robinson, 2012; Perkins et al., 2013; Goldin, 2016; ACBF, 2017; Mateer and Coppock, 2018; and Torvik, 2020) and also influences growth translation into PR (Alence, 2004; OECD, 2008; Szirmai, 2005; & 2008; Bluhm and Szirmai, 2012; and Fosu, 2022).

Findings on the importance of weighted average governance IQ and its dimensions of the rule of law, control of corruption, government effectiveness, and voice and accountability for poverty-reducing effects of the measures of growth support the work of Khan (2011) on Governance, Growth and Poverty Reduction. Khan (2011) argued that it is possible for good governance reforms to enhance the effect of growth on PR in poor countries through improved income distribution. He emphasised that since income distribution is arithmetically related to poverty and growth, an increased income distribution caused by improved mixed of market-enhancing and growth-enhancing governance institutional quality can correspondingly cause the increased impact of growth on poverty reduction. This, as Khan (2011) revealed, can primarily be done through two pathways: First, through good governance reforms focusing on pro-poor service delivery as a way of government accountability, often through re-allocation of resources to invest in human capital and increased access of the poor to potential resources for increased employment/job opportunities. Second, through the protection of property rights and efficient rule of law, and through anti-corruption policies and democratization. These pathways, according to Khan (2011), theoretically allow the poor to protect their rights better, demand better services from the state, and ensure that a greater part of the public goods that they are entitled to are in fact delivered. The findings also align with inclusive growth frameworks (ADB, 2011; AfDB, 2012; and Cerra, 2022). These frameworks are built on strategic objectives that high quality of institutions and good governance motivate inclusive growth that allows people including the poor to participate in, and benefit from the growth process. These can accordingly be achieved through increased access to sufficient economic opportunities (and productive jobs), and the relative equal rights and access to accountable and transparent delivery of basic goods and services, as well as empowerment in social and political life.

Across columns 1 to 4 of Table 2.1a, the coefficients of changes in income inequality and population in the global sample are positive and statistically significant and hence indicate their contributions to further increase in extreme poverty. Such observations are often possible, especially at the initial stage of institutional reforms for economic development, which may have direct linkage with Kuznets (1955) theoretical hypothesis and its explanations put forward by others (Khan, 2007; Acemoglu and Robinson (2012); and Weil, 2013) as presented above in this section. These results are consistent with other studies (Ravallion and Chen, 2007; Christiaensen et al., 2011; Thorbecke, 2014; Chuhan-Pole, 2014; Filmer and Fox, 2014; and Erumban and de Vries, 2021) which generally found the increased growth rates of population and the rising levels of income inequality as barriers to the poverty-reducing effect of EG in developing countries.

However, the measure of initial human capital (life expectancy), is found to play a statistically significant role in reducing poverty. This is in line with Khan (2011) who argues that it is possible for good governance reforms to enhance the effect of growth on PR in developing or poor countries through good governance reforms focusing on pro-poor service delivery as a way of government accountability by investment of re-allocated resources in human capital and increased access of the poor to potential resources for increased employment/job opportunities.

Columns 5 and 6 of Table 2.1a presents results from regression models respectively without and with IQ terms in independent SSA cross-country sample. In addition to the agriculture and services value-added growth elasticities of poverty observed to be both negative and statistically insignificant in models without IQ, the study finds no statistically significant evidence that the effect of any of the sectoral value-added growth on PR depends on the level of IQ in SSA at \$1.90/day poverty headcount. The lack of significance may be due to the limited sample of observations. For control variables, none of them show significant evidence of contributing to PR in the SSA at \$1.90/day poverty headcount.

At \$3.20 per day poverty headcount (Appendix 2A), only the value-added growth elasticity of poverty in the global sample regression model without regional dummies is found to be negative (-0.82) and statistically significant at the 10% level. In the global sample regression model with regional dummies, the services value-added growth elasticities of poverty are negative and statistically significant in EAP, SA, and SSA regions in similar manner as those found at \$1.90/day poverty headcount, despite the reduction in magnitudes. However, only in MENA that the agriculture value-added growth elasticity of poverty found to be negative (-10.88) and statistically significant.

Contrary to the results obtained at \$1.90/day poverty headcount, only the coefficient of the term of interaction between IQ and industry value-added growth is negative and statistically significant in the global sample regression without regional dummies at the \$3.20/day poverty headcount (column 3 of Appendix 2A). For the marginal effects of manufacturing/industry value added growth to depend on IQ at this poverty headcount, the expression, based on column 3 regression in Appendix 2A, is given by:

$$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = -0.941 - 1.103\ (IQ)$$

In Table 2.1b, while IQ takes different percentile values, the effect of the term of interaction between IQ and manufacturing/industry value-added growth on poverty at \$3.20/day poverty headcount is shown to range from -0.077 (10^{th} percentile) to -3.880 (99^{th} percentile). This influence of IQ on the contributions of manufacturing/industry value added growth to PR is largely due to the rule of law (RL) and voice and accountability (VA) dimensions of IQ (see Appendix 4B1 on regression results for the dimensions of IQ). In a global sample regression with regional dummies, the coefficient of the terms of interaction between the weighted average IQ and each of the sectoral value-added growth is negative as expected but statistically insignificant at $3.20/day poverty headcount. However, in Appendix 4B1, the coefficients of the interaction between manufacturing/industry value added growth and each of RL and VA dimensions of IQ is negative as expected and statistically significant at $3.20/day poverty headcount with similar results as those obtained at the $1.90/day poverty headcount.

Also, results for the coefficients of agriculture and services value-added growth in the SSA cross-country sample regressions with and without IQ terms (columns 5 & 6 of Appendix 2A) are similar to those obtained at $1.90/day poverty headcount. Moreover, similar results are obtained, where there is no statistically significant evidence of the contribution of any of the sectoral value-added growth to PR. Besides, the insignificant contributions of these sectoral growth measures do not depend on the level of IQ in the SSA at $3.20/day poverty headcount. For control variables in the SSA sample regressions at the $3.20/day poverty headcount, the results are similar to those at $1.90/day poverty headcount in SSA cross-country sample regressions.

3.4.2.2 Regression Results on Sectoral Labour Productivity Growth

Table 2.2a presents regression results on the effects of sectoral labour productivity growth. In column 1 of Table 2.2a findings from non-regional global sample regression without IQ terms at $1.90/day poverty headcount show that the services and agriculture labour productivity growth (LPG) elasticities of poverty are negative and statistically significant. The findings reveal that a one percent increase in services and agriculture LPG contributes to respectively 2.6% and 2.3% reductions in extreme poverty. In the global sample regression with regional dummies (column 2 of Table 2.2a), the services LPG elasticity of poverty is negative and statistically significant in the SA, EAP, and SSA. In these regions, one percent increase in services LPG contributes to 3.8%, 3.7%, and 2.0% reductions in extreme poverty in SA, EAP, and SSA respectively. Also, while manufacturing/industry LPG shows no evidence of significant effect on poverty, the agriculture LPG elasticity of poverty in the same global sample regression with regional dummies is negative and statistically significant in only EAP (-10.3).

These findings are in line with those obtained from other literature (Gutierrez et al., 2007; and Imai, Gaiha, and Bresciani, 2019) who found non-agricultural LPG (in this case services LPG) as the major contributing sector to PR, and from other set of sources (Datt and

Ravallion, 1998; Loayza and Raddatz, 2010 Ogundipe et al., 2017; and Ivanic and Martin, 2018) who found agricultural LPG as the main driver for PR.

For the terms of interaction between sectoral LPG components and IQ in the global sample regression at $1.90/day poverty headcount, the analysis is presented in columns 3 and 4 of Table 2.2a. The study finds no statistically significant evidence of the contribution of the terms of interaction between the weighted average level of IQ and any of the sectoral LPG components to PR in both regional and non-regional dummy global sample regressions. However, regression results for the dimensions of IQ in **Appendix 4B2** show that the effects of the term of interaction between agriculture LPG and any of government effectiveness (GE) and regulatory quality (RQ) dimensions of IQ in the global sample regressions with non-regional dummies is negative and statistically significant. As expected, this indicates that the effect of agriculture LPG on PR depends on the level of IQ in the global sample. Table 2.2b presents the marginal effect analysis of the interaction effects of agriculture LPG and each of the levels of GE and RQ institutional dimensions at different percentile levels. The table reveals that the net effects on PR occur from a minimum threshold of 25th percentile values of GE and RQ and get larger (higher magnitude of negative value) in high GE and RQ environments. For such marginal effects of agriculture LPG depending on IQ are based on the partial differential expressions in Table 2.2b. GE or RQ takes different percentile values, and -8.059 for GE-agriculture LPG and -4.514 for RQ-agriculture LPG are the conditional effects of agriculture LPG, while -11.420 and -5.734 are the marginal effects of strengthening GE and RQ for agriculture LPG. In the same Table 2.2b, the effects of the terms of interaction between agriculture LPG and each of the levels of GE and RQ on extreme poverty are shown to range from -1.694 (25th percentile) to -23.947 (99th percentile), and from -1.589 (25th percentile) to -12.900 (99th percentile) respectively.

In a global sample regression model regional dummies results for the dimensions of IQ presented in Appendix 4B2 show that the coefficient of the terms of interaction between services LPG and each of the regulatory quality (RQ) and control of corruption (CC) dimensions of IQ is negative and statistically significant. **Appendix 2H** reveals results of the marginal effect analysis of the coefficient of the interaction terms at different percentile levels of RQ or CC and services LPG across regions. The result shows that services LPG significantly reduces extreme poverty at all levels of RQ and CC in all other regions except in SSA region, which is from a minimum threshold of 25th percentile values of both RQ and CC in the region.

Table 2.2a: OLS Regression Results for Sectoral Labour Productivity Growth at $1.90/day Poverty Headcount Measure

Dependent Variable: Δlog $1.90/day poverty headcount measure, Δloghc_19$_{it}$						
	Models without IQ		**Models with IQ**		**SSA Mod with/without IQ**	
Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Agriculture Lab. Productivity growth	-2.560*		-3.730		-0.176	0.701
	(1.409)		(2.736)		(0.994)	(1.626)
Industry Lab. Productivity growth	0.407		1.060		0.562	-0.232
	(0.742)		(1.260)		(0.634)	(1.034)
Services Lab. Productivity growth	-2.273***		-2.144**		-1.036	-0.149
	(0.717)		(1.035)		(0.756)	(1.004)
Agriculture Lab. force expansion	-3.756	-3.080	-6.706**	-3.980	-0.853	-0.0932
	(2.803)	(2.763)	(2.968)	(3.274)	(2.057)	(2.123)
Industry Lab. force expansion	-1.751*	-0.591	-1.726	-0.678	0.433	0.0902
	(0.975)	(1.075)	(1.310)	(1.435)	(0.805)	(0.655)
Services Lab. force expansion	-1.146	-2.094**	-1.694	-2.684**	-0.956	-0.819
	(0.911)	(1.061)	(1.037)	(1.240)	(0.816)	(0.661)
Institutional Quality (IQ)			0.00984	0.00391		-0.00705
			(0.0159)	(0.0164)		(0.0183)
(Agriculture Lab. Product. growth) * IQ			-2.844	-2.192		0.242
			(2.190)	(2.319)		(1.271)
(Industry Lab. Product. growth) * IQ			0.897	1.187		0.813
			(0.947)	(1.035)		(1.185)
(Services Lab. Product. growth) * IQ			-0.318	-0.648		-1.296
			(0.784)	(0.801)		(0.996)
Agric Lab. Product. growth*regional dummy variab						
East Asia and Pacific (EAP)		-10.29*		-17.82*		
		(5.399)		(9.457)		
Europe & Central Asia (ECA)		19.85		85.67**		
		(24.30)		(38.82)		
Latin America & Caribbean (LAC)		-3.100		-0.710		
		(3.675)		(6.021)		
Middle East & North Africa (MENA)		-10.47		-4.719		
		(7.955)		(9.332)		
South Asia (SA)		0.383		0.697		
		(2.742)		(3.891)		
Sub-Saharan Africa (SSA)		-0.859		-1.521		
		(1.350)		(2.964)		
Indust Lab. Product. growth*regional dummy variab						
East Asia and Pacific (EAP)		2.546		4.110*		
		(1.600)		(2.447)		
Europe & Central Asia (ECA)		-3.390		-4.412		
		(16.41)		(13.73)		
Latin America & Caribbean (LAC)		1.793		3.592**		
		(1.207)		(1.394)		
Middle East & North Africa (MENA)		5.905		1.535		
		(3.728)		(7.863)		
South Asia (SA)		2.675		6.065		
		(2.017)		(4.927)		
Sub-Saharan Africa (SSA)		-0.505		-0.919		
		(0.833)		(1.188)		
Services Lab. Product. growth*regional dummy varia						
East Asia and Pacific (EAP)		-3.709**		-2.892		
		(1.710)		(2.869)		
Europe & Central Asia (ECA)		4.078		-11.13		
		(22.52)		(17.99)		
Latin America & Caribbean (LAC)		-1.220		-1.080		
		(0.797)		(1.065)		
Middle East & North Africa (MENA)		-0.479		-3.444		
		(3.286)		(5.367)		
South Asia (SA)		-3.773**		-5.530*		
		(1.614)		(2.954)		
Sub-Saharan Africa (SSA)		-2.024**		-1.068		
		(0.983)		(1.250)		
Change in inequality (dGini)	2.353***	2.647***	2.413***	2.555***	0.546	0.948*
	(0.503)	(0.553)	(0.706)	(0.791)	(0.407)	(0.473)
Initial Gini (lnsGini)	0.00817	0.0145	0.0312	-0.00687	0.0234	0.0402
	(0.0336)	(0.0418)	(0.0482)	(0.0496)	(0.0451)	(0.0672)
Initial life expectancy	-0.238***	-0.222***	-0.244***	-0.220***	-0.0901	-0.0587
	(0.0371)	(0.0534)	(0.0435)	(0.0639)	(0.0833)	(0.0610)
Constant	0.966***	0.915***	0.999***	0.880***	0.363	0.246
	(0.163)	(0.232)	(0.185)	(0.271)	(0.338)	(0.242)
Observations	233	233	162	162	57	42
R-squared	0.301	0.372	0.321	0.436	0.155	0.358

Robust standard errors in parentheses; and (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fourth columns*

Table 2.2b: Impact of Interaction Terms on Poverty at different Levels of Government Effectiveness (GE) and Regulatory Quality (RQ) Institutional Dimensions

Percentile	GE Percentile Values	*Analysis for Agriculture Labour Productivity Growth and GE at $1.90/day poverty headcount*	RQ Percentile Values	*Analysis for Agriculture Labour Productivity Growth and RQ at $1.90/day poverty headcount*
		$\frac{\partial(Pov.rt)}{\partial(Agr\_LPG)} = -8.059 - 11.420\ (GE)$		$\frac{\partial(Pov.rt)}{\partial(Agr\_LPG)} = -4.514 - 5.734\ (RQ)$
10thP	-0.808571	**1.175**	-0.8702891	**0.476**
25thP	-0.5573869	**-1.694**	-0.5100792	**-1.589**
50thP	-0.1541544	**-6.299**	-0.0801218	**-4.055**
75thP	0.2274908	**-10.657**	0.3163688	**-6.328**
90thP	0.9815608	**-19.268**	0.6254485	**-8.100**
99thP	1.391275	**-23.947**	1.462517	**-12.900**

***The 10thP, 25thP, 50thP, 75thP, 90thP, & 99thP values used are obtained from detailed descriptive statistics*
Note: *Pov.rt = Rate of poverty; Agr_LPG. = Agricultur labour productivity growth*

In terms of the marginal effect of services LPG depending on RQ or CC, the expressions based on the respective regressions are given in Table 2.2c, where RQ or CC takes different percentile values. For instance, for services LPG results in EAP, -3.024 is the conditional effect of services LPG, and -2.268 is the marginal effect of strengthening RQ, and so on for other regions and dimensions of IQ.

As shown in Appendix 2H, the effect of the term of interaction between services LPG and either RQ or CC on extreme PR at $1.90/day poverty headcount ranges from -1.387 (at the 10th percentile) to -6.889 (99th percentile) in EAP, from -7.077 (10th percentile) to -11.296 (99th percentile) in ECA, from -0.126 (10th percentile) to -5.467 (99th percentile) in LAC, from -2.780 (10th percentile) to -6.618 (99th percentile) in MENA, from -3.414 (10th percentile) to -6.618 (99th percentile) in SA, and from -0.328 (25th percentile) to -4.362 (99th percentile) in SSA.

Like for value-added sectoral compositions of growth, these findings are consistent with the theoretical and empirical literature on the importance of inclusive political and economic for enhancing sustained and inclusive EG (Engerman and Sokoloff, 1997, 2002; Acemoglu et al., 2001 & 2002; Acemoglu and Robinson, 2012; Perkins et al., 2013; Goldin, 2016; ACBF, 2017; Mateer and Coppock, 2018; and Torvik, 2020) and the translation growth into PR (Alence, 2004; OECD, 2008; Szirmai, 2005; & 2008; Bluhm and Szirmai, 2012; and Fosu, 2022).

Moreover, the specific findings revealing the importance of government effectiveness, regulatory quality, and control of corruption institutional dimensions for the poverty-reducing effects of services and agriculture labour productivity growth, support the work of Khan (2007), Zhuang et al. (2010), and Acemoglu and Robinson (2012). These sources in one way or the other present different institutional frameworks constituting accountability, rule of law, political stability, bureaucratic capability, property rights protection and contract enforcement, effective government participation, and control of corruption, representing a cluster of mutually reinforcing growth and market enhancing formal political and economic institutions. The frameworks emphasised that societies need public services and infrastructure as well as some types/forms of regulations in order to function well. The three institutional dimensions fit within these frameworks. For instance, government effectiveness measures performance on availability of governance capabilities to ensure efficient and low-cost contracting and dispute resolution, accountable quality service provision of public goods, and civil service independence from political influence. Regulatory quality captures performance on the use of good legal system for effective regulations on business and the role of government in the economy, and private sector participation in development for efficient markets. Control of corruption minimizes such things as elite capture, expropriation risk, grand corruption and rent seeking, transaction costs, and disruption of contracts and property rights.

Table 2.2c: Effects of the Interaction Between Services Labour Productivity Growth and the Level of Regulatory Quality and Control of Corruption across Regions

Percentiles	***Analysis for Services Labour Productivity Growth and Regulatory Quality (RQ) at $1.90/day poverty headcount***	***Analysis for Services Labour Productivity Growth and Control of Corruption (CC) at $1.90/day poverty headcount***
East Asia & Pacific (EAP)	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -3.024 - 2.268(RQ)$	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -3.836 - 2.285(CC)$
Europe & C. As. (ECA)	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -10.39 - 2.268(RQ)$	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -8.269 - 2.285(CC)$
Lat. Amr. & Car. (LAC)	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -0.906 - 2.268(RQ)$	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -1.843 - 2.285(CC)$
Mid. East & N. Afric. (MENA)	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -3.858 - 2.268(RQ)$	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -4.432 - 2.285(CC)$
South Asia (SA)	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -5.335 - 2.268(RQ)$	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -6.944 - 2.285(CC)$
Sub-Saharan Africa (SSA)	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -1.732 - 2.268(RQ)$	$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -2.168 - 2.285(CC)$

Note: *Pov.rt = Rate of poverty; SLPgrt. = Services labour productivity growth*

In columns 1 to 4 of Table 2.2 in the global sample, the coefficients of changes or growth in income inequality are positive and statistically significant. Typically, one percent increase in the growth rate of Gini contributes significantly to the increase in poverty at the $1.90/day poverty headcount within the ranges of 2.3 to 2.6%. These findings are consistent with other studies (CSLS, 2004; Ravallion and Chen, 2007; Christiaensen et al., 2011; Chuhan-Pole, P., 2014; Hamit-Haggar and Souare, 2018; and Erumban and de Vries, 2021) which revealed the rising levels of income inequality as a major barrier to the poverty-reducing effect of EG and its components. However, initial life expectancy at birth and the sectoral labour force participation or employment expansion are mostly negative as expected and play statistically significant roles in PR.

Despite the negative coefficients of sectoral LPG components and IQ in the SSA cross-country sample (column 5 and 6 of Table 2.2a), there is no statistically significant evidence that the effect of any of the sectoral LPG on PR depends on the level of IQ in this region at \$1.90/day poverty headcount. Moreover, the coefficients of all other control variables in the SSA sample are not significant at this poverty headcount except for the change or growth in income inequality that is positively significant and seen to contribute to the increase in poverty at the 10 percent level in the region.

At \$3.20/day poverty headcount (Appendix 2B), a similar result as that at \$1.90/day poverty headcount is obtained, especially in terms of the sign of the coefficient and level of statistical significance for the services LPG elasticity of poverty in the non-regional dummy global sample regression model without IQ. For this, findings from column 1 of Appendix 2B show that a one percent increase in services LPG contributes to 1.4% in PR. In the non-IQ global sample regression model regional dummies (column 2 of Appendix 2B), the services LPG elasticity of poverty is maintained despite the slight differences in magnitudes, as being negative and statistically significant at the 5% level in EAP and SA regions, and then in LAC instead of SSA. A one percent increase in services LPG in these regions contributes to 2.1%, 1.7%, and 1.5% in PR in EAP, SA, and LAC respectively. In contrast to findings at \$1.90/day poverty headcount, the industry and agriculture LPG elasticities of poverty at \$3.20/day poverty headcount are negative and statistically significant in ECA (-24.0) and LAC (-5.1).

Also, in Appendix 2B, the coefficient of the terms of interaction between the weighted average IQ and any of the sectoral LPG on PR is statistically insignificant at \$3.20/day poverty headcount (columns 3 and 4). Meanwhile, the result obtained for the term of interaction between RQ and services LPG in the global sample regression with regional dummies at this poverty headcount is similar to that obtained at \$1.90/day poverty headcount. Notwithstanding, findings for control variables, especially for changes or growth in income inequality and initial life expectancy are consistent with results obtained at \$1.90/day poverty headcount. Moreover, there is also no evidence of statistically significant effect of any of the sectoral LPG on PR being dependent on the level of IQ and its dimensions in the SSA cross-country sample. Furthermore, the effects of control variables on PR at \$3.20/day poverty headcount are similar to results found at \$1.90/day poverty headcount in the SSA cross-country sample.

3.4.2.3 Regression Results on Structural Change and Sector Productivity Growth

Regression results on the effect of structural change and sector productivity for models with and without IQ terms are presented in Table 2.3a. In a non-regional dummy global sample regressions without IQ terms at the $1.90/day poverty headcount presented in column 1 of Table 2.3a the structural change and sector productivity growth elasticities of poverty are negative as expected and statistically significant. Findings show that one percent increases in the growth rates of structural change and sector productivity growth respectively contributes to 1.3% and 1.1% reduction in extreme poverty.

In a non-IQ global sample regression with regional dummies (column 2 of Table 2.3a), the study finds that the sector productivity growth elasticity of poverty is negative and statistically significant in SSA, EAP, and SA. Findings show that a one percent increase in sector productivity growth contributes to extreme PR by 1.2%, 1.0%, and 1.0% in SSA, EAP, and SA respectively. Also, the structural change elasticity of poverty is negative and statistically significant in only the EAP region, where evidence shows that a one percent increase in structural change contributes to extreme PR by 2.6%. These findings are consistent with other results in literature (Naiya, 2013; Christiaensen and Todo, 2014; Shimelese, 2014; Hasan et al., 2015; Benfica and Henderson, 2021) who found structural change as a major contributor to PR, and for those (Gupta et al., 2018; and Gupta and Gupta, 2020) who found sector productivity growth as a key driver for PR. Also resonating with the above literature, unlike sector productivity growth that comparatively have larger significant effect on PR in SSA, the contribution of structural change to PR in SSA is weaker and insignificant relative to other regions.

Such insignificant findings for the effect of structural change (the main channel of structural transformation) on PR in SSA is in contrast with implications of the rapid growth observed in SSA. This is, however, in line with literature. For instance, Fox et al (2017) and Adegboye & Ighodaro (2020) argue that the pattern of structural change in sub-Saharan African countries has led to more low-productivity and vulnerable jobs generation. This is due to the strong movement in the shares of labour and output from low-productivity agriculture sector into lower-productivity non-agricultural and non-tradable services sectors with informal low-wage jobs rather than into manufacturing/industry. They, however, revealed that the slow movement of output and employment into the manufacturing sector is due to rapid labour force growth, slow expansion of the tradable sector that can employ low and moderately skilled labour and the general weakness of productivity in the services sectors compared to the manufacturing sector.

Indeed, in A**ppendix 2E**, this study shows evidence across regions on the reduction in average shares of both real value-added and labour employed in agriculture and the corresponding increase in the shares of these dimensions for services, instead of manufacturing/industry, which seems to be relatively stagnated over the study period. Such theoretically pre-mature structural transformation or de-industrialization is, according to literature, typical of characteristics likely to affect the poverty reducing effect of the manufacturing/industry sector and structural transformation as a whole. In line with others, although the manufacturing/industry sector substantially contributed to the impressive growth in SSA, it stagnated shares of real value-added and labour employed has hence limited its contributions to PR (Chuhan-Pole, 2014; and Berardi and Marzo, 2017).

Some other evidence argues that while manufacturing/industry has a higher rate of technology transfer with a higher potential for productivity catch-up, the employment absorption in the non-agricultural sectors is mainly concentrated in the informal and weak productivity services sector. The transformation is dominated by high shares of vulnerable employment from the low-productivity agriculture sector into low-productivity informal services sector, mainly the household enterprises in the trading and personal services sectors that have limited potential for international markets. These have constrained the positive contribution of structural change to average labour productivity growth in Africa, which is the major link between growth and poverty (Mcmillan and Rdrik, 2011; De Vries et al, 2015; Page and Shimeles, 2015; Fox et al, 2017; Diao et al., 2019; Adegboye and Ighodaro, 2020; and Benfica and Henderson, 2021).

Berardi and Marzo (2017) in line with the above sources argued that although the composition of growth and its overall intensity remains important for PR, there is limited exploitation of the extractive primary commodity exports natural resources to promote economic diversification in the commodity-driven growth sectors that currently lack pro-poor potential in most African economies. Hence, a stagnated or declining share of the labour force in the high-productivity manufacturing sector. In addition to the dismal initial conditions in terms of per capita income, and social development, the concentration of growth in commodity exports is not conducive to PR in Africa. Regardless of these opportunities, they argued that establishment of the high value-addition productivity extractive industries are very capital-intensive and require infrastructure, human capital, technical innovations, and the level of private sector investment and participation that is lacking in Africa. Cramer et al. (2020) however emphasised the limited investment in certain sectors of the economy, especially the manufacturing/industry sector that matters for enhanced sustained economic growth, structural change, productivity, wage employment growth, and welfare improvements in developing countries. They argued that private sector enterprises are often reluctant to invest in low-income and slow-growing economies, due to pervasive uncertainties and the high risks investors face, the lack of infrastructure, and the insufficient skills and technical know-how in these economies.

Other challenges emphasised by others (Filmer and Fox, 2014; and OECD, 2018) is that the impressive economic growth in Africa, especially through the non-farm sectors, have not and will not generate enough new non-farm wage employment to absorb both the new entrants and those seeking to leave agriculture. This is because the limited basic education in terms of literacy and numeracy levels of students and new graduates prevent the private sector from expanding wage employment in internationally competitive firms, as it would take so long for schools and tertiary institutions to produce new workers with the sets of required basic educational skills and knowledge. Also, Cramer et al. (2020) argue that the unavailability of quality relevant training for in-demand skills and occupations, along with accessible and timely labour market information has resulted in a mismatch between the demand for and supply of skilled labour to effect growth and development. Indeed, in addition to the disappointing performance of schools in terms of decline in literacy and numeracy proficiency, the shortage of qualified Technical and Vocational Education and Training (TVET) staff, coupled with obsolete equipment, and the limited collaboration between TVET institutions and the employers, have reduced the ability of young adults to engage in further learning and to adapt to changes in the pattern of labour demand (Yamada et al., 2018). Accordingly, Cramer et al. (2020) argue that while high failure rates of self-employed and small businesses with little/no room for wage employment opportunities particularly for young people remain a global phenomenon, such firms managed by young people have failed at much higher rates compared with larger firms in existence for over 10 years employing at least 100 workers with better wages and working conditions.

Furthermore, Diao et al. (2019) find significant growth-promoting structural change that has been accompanied by mostly negative labour productivity growth within non-agricultural sectors in the study countries. As an indication of the relatively poor performance of the manufacturing sector in SSA, the growth, instead of the modern sector, is driven by positive aggregate demand shocks due to foreign transfers or by productivity growth in the traditional (agriculture) sector.

Analysis of the effect of the terms of interactions between IQ and structural change or sector productivity growth in the global sample regressions at $1.90/day poverty headcount are presented in columns 3 and 4 of Table 2.3. The study finds no statistically significant evidence of the effects of the terms of interaction between the weighted average level of IQ and any of structural change and sector productivity growth on PR in the non-regional dummy global sample regression. This means that the effect of structural change or sector productivity growth on PR is independent of the weighted average or cluster of governance IQ environment.

However, regression results for the dimensions of IQ shown in Appendix 4B3 reveal that the coefficient of the terms of interaction between structural change and voice and accountability (VA) dimension of IQ is negative and statistically significant in the global sample regression with regional dummies. Results of the marginal effect analysis of the coefficient of the term of interaction between the level of VA and structural change at different percentile values of VA across regions are presented in Appendix 2I. Findings show that structural change significantly reduces extreme poverty at all percentile levels of VA in EAP and ECA regions while in the SSA region, it reduces from a minimum threshold of 50th percentile values of VA in that region. In terms of the marginal effect of assessing whether the poverty-reducing effect of structural change depending on VA, the expressions based on the regressions, are given in Table 2.3b. Where VA takes different percentile values for variations in structural change results in EAP, -5.651 is the conditional effect of structural change, and -2.492 is the marginal effect of strengthening VA, and so on for the corresponding values in other regions.

Drawn from Appendix 2I, the effect of the terms of interaction between structural change and VA on extreme PR ranges from -1.436 (at the 10th percentile) to -8.016 (99th percentile) in EAP, from -0.827 (10th percentile) to -1.671 (99th percentile) in ECA, and from -0.615 (50th percentile) to -3.628 (99th percentile) in SSA.

Indeed, voice and accountability in this study measures a country's performance on the ability of institutions to protect civil liberties, extent of citizens participation in the selection of government, independence of the media, equal opportunity for all, transparency of the business environment and government actions, and the extent of institutional stability and accountability. This means that the above results are aligned with the market-enhancing governance institutional framework by Khan (2007) on the aspect of efficient markets requiring that the state delivers public goods that the private sector cannot provide, which in turn theoretically requires an accountable and transparent government to convert a collective willingness to pay into efficient delivery of public goods and services. The findings are also in line with the emphasis by Acemoglu and Robinson (2012) that societies need public services and infrastructure and that while inclusive institutions are the bedrock for economic prosperity, political institutions of societies remain the key determinant of the outcome of the games governing incentives in politics. This as they argued may include how governments are chosen and what their rights should be, as pathways to achieving economic prosperity. Moreover, the results are in support of the institutional hypothesis framework by Zhuang et al. (2010), which captures dimensions of accountability and transparency, checks and balances, and wide participation of various actors as part of the requirements for social order and control. Furthermore, the findings are consistent with the objectives of inclusive growth frameworks by Asian Development Bank (2011), African Development Bank (2012), and Cerra (2022). These frameworks argue that while high IQ and good governance enhance inclusive growth, they also allow people including the poor to participate in, and benefit from the growth process through increased access to economic opportunities and the relative equal rights and access to basic services, and sustainable empowerment. All of these are channels through which institutional quality enhances growth composition for PR.

Across columns in the global sample regressions 1 to 4 of Table 2.3, the coefficients of the changes or growth in income inequality are positive and statistically significant with one percent increase in the growth rate of Gini inequality contributing to increase in poverty by 2.3 to 2.6% at $1.90/day poverty headcount. The findings resonate with studies which found the increased growth of income inequality as a barrier to the poverty-reducing effect of the measures of EG (Ravallion and Chen, 2007; Christiaensen et al., 2011; Thorbecke, 2014; Chuhan-Pole, 2014; and Erumban and de Vries, 2021). However, the coefficients of the initial life expectancy and aggregate growth of labour force participation or employment expansion across these regression models are negative as expected and play a statistically significant role in PR at the 1% level.

In the SSA cross-country sample regressions (columns 5 and 6 of Table 2.3), there is no statistically significant evidence of structural change or sector productivity growth on PR, neither are there any of the effects of these growth measures depending on the level of weighted average governance IQ in SSA region at $1.90/day poverty headcount. Such results are in line with those obtained by others (Page and Shimeles, 2015; and Erumban and de Vries, 2021) who found no evidence of structural change contribution to PR in SSA compared with other regions. Furthermore, the coefficients of all other control variables in the SSA sample regressions are not significant except for the changes/growth in Gini income inequality that is positive and statistically significant and hence contribute to the increase in poverty at the 10 percent level.

At $3.20/day poverty headcount in the non-IQ global sample regressions (columns 1 and 2 of Appendix 2C), similar results are obtained in terms of the sign and statistical significance of both structural change and sector productivity growth elasticities of poverty. Findings in column 1 are almost the same as those obtained at $1.90/day poverty headcount for structural change and sector productivity growth elasticities of poverty. In global sample regression with regional dummies (column 2) at $3.20/day poverty headcount, the sector productivity growth elasticity of poverty is negative and statistically significant in the EAP, SSA, and then LAC regions. A one percent increase in sector productivity growth in these regions contributes to 0.6%, 0.7%, and 0.9% in PR in EAP, SSA, and LAC respectively. Also, the structural change elasticity of poverty at $3.20/day poverty headcount are negative and statistically significant in ECA (-5.5) and EAP (-1.4) at the one and five percent significance levels respectively.

Also, results from global sample regressions with IQ terms at $3.20/day poverty headcount are presented in columns 3 & 4 of Appendix 2C. The study finds no statistically significant evidence of the effect of the terms of interaction between IQ and either structural change or sector productivity growth on PR at $3.20/day poverty headcount. The results are similar to those obtained at $1.90/day poverty headcount, except that in the global sample regression with regional dummies (column 4), the structural change elasticity of poverty are negative and statistically significant in ECA (-5.6) and EAP (-2.6). Moreover, findings on the coefficients of control variables in columns 1 to 4 of Appendix 2C, including the changes or growth rate of Gini income inequality, aggregate labour force participation or employment expansion, and initial life expectancy are similar to results obtained at $1.90/day poverty headcount.

In the SSA cross-country sample regressions (columns 5 & 6 of Appendix 2C), there is also no statistically significant evidence of the effect of structural change and sector productivity growth on PR at the $3.20/day poverty headcount in the region. However, findings regarding control variables show evidence of statistically significant effects of the growth rate of labour force participation (column 5) and the initial life expectancy (column 6) on PR in SSA cross-country sample at the $3.20/day poverty headcount.

Table 2.3a: Regression Results for Structural Change and Sector Productivity Growth at $1.90/day Poverty Headcount Measure

Dependent Variable: Δlog $1.90/day poverty headcount measure, Δloghc_19$_{it}$						
	Models without IQ		**Models with IQ**		**SSA Mod with/without IQ**	
Explanatory vvariables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Structural Change	-1.315***		-1.134		0.192	0.548
	(0.506)		(0.795)		(0.451)	(0.491)
Sector Productivity growth	-1.108***		-0.878*		-0.261	-0.151
	(0.302)		(0.509)		(0.337)	(0.397)
Institutional Quality (IQ)			0.00284	0.00874		-0.0103
			(0.0155)	(0.0158)		(0.0151)
(Structural Change) * IQ			-0.107	-0.523		0.483
			(0.856)	(0.867)		(0.484)
(Sector Product. growth) *IQ			0.00219	-0.203		-0.383
			(0.617)	(0.662)		(0.460)
Structural change* egional dummy variable						
East Asia and Pacific (EAP)		-2.564***		-4.372***		
		(0.972)		(1.609)		
Europe & Central Asia (ECA)		-2.562		-1.441		
		(2.525)		(3.311)		
Latin America & Caribbean (LAC)		0.102		1.134		
		(1.134)		(1.802)		
Middle East & North Africa (MENA)		-2.764		6.043		
		(8.062)		(14.25)		
South Asia (SA)		-0.763		-0.184		
		(0.775)		(1.153)		
Sub-Saharan Africa (SSA)		-0.639		-0.341		
		(0.592)		(0.788)		
Sector Productivity growth * regional dummy variable						
East Asia and Pacific (EAP)		-1.027*		-0.512		
		(0.524)		(0.834)		
Europe & Central Asia (ECA)		3.613*		3.376		
		(1.983)		(2.147)		
Latin America & Caribbean (LAC)		-0.301		0.0929		
		(0.611)		(0.857)		
Middle East & North Africa (MENA)		0.394		-4.101		
		(2.624)		(4.972)		
South Asia (SA)		-0.969*		-1.021*		
		(0.522)		(0.607)		
Sub-Saharan Africa (SSA)		-1.197**		-0.751		
		(0.491)		(0.579)		
Growth rate of lab employed in popn.	-1.723**	-1.807**	-2.417**	-2.585**	-0.697	-0.644
	(0.830)	(0.879)	(0.979)	(1.039)	(0.474)	(0.492)
Change in inequality (dGini)	2.663***	2.723***	2.746***	2.671***	0.501	0.925*
	(0.521)	(0.548)	(0.721)	(0.735)	(0.424)	(0.458)
Initial Gini (lnsGini)	0.0439	0.0285	0.0581	0.0153	0.0325	0.0294
	(0.0332)	(0.0389)	(0.0473)	(0.0552)	(0.0401)	(0.0595)
Initial life expectancy	-0.209***	-0.202***	-0.216***	-0.171***	-0.0910	-0.0911
	(0.0410)	(0.0537)	(0.0494)	(0.0652)	(0.0796)	(0.0675)
Constant	0.876***	0.829***	0.906***	0.673**	0.361	0.349
	(0.175)	(0.229)	(0.206)	(0.265)	(0.326)	(0.267)
Observations	233	233	162	162	57	42
R-squared	0.265	0.298	0.287	0.365	0.129	0.324

Robust standard errors in parentheses; and (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fourth columns*

Table 2.3b: Effects of the Interaction Between Structural Change *and the Level of Voice and Accountability (VA) Dimension of Institutional Quality across Regions*

Percentiles	***Analysis for Structural Transformation and Voice and Accountability (VA) at $1.90/day poverty headcount***
East Asia & Pacific (EAP)	$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = -5.651 - 2.492(VA)$
Europe & Central Asia (ECA)	$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = -1.670 - 2.492(VA)$
Latin America & Caribbean (LAC)	$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = 1.885 - 2.492(VA)$
Middle East & North Africa (MENA)	$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = 5.519 - 2.492(VA)$
South Asia (SA)	$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = -1.042 - 2.492(VA)$
Sub-Saharan Africa (SSA)	$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = -1.362 - 2.492(VA)$

Note: *Pov.rt = Rate of poverty; ST.grt. = Structural change*

3.4.2.4 Instrumental Variable (IV) Regression Results

Generally, the consistent and efficient estimator preference of OLS or IV regression results is determined by the tests for endogeneity of models and regressors, and the test for instrument validity. This section builds on evidence already discussed into detail in section 2.4.3.1 of this thesis document on the test for endogeneity of models and regressors of interest (Durbin, 1954; Wu, 1973; & Hausman, 1978), and the test of instrument validity in the first-stage regression (Baum, 2006; Kennedy, 2008; Cameron and Trivedi, 2009; Gujarati, 2015; Wooldridge, 2020; Stock and Watson, 2020; & StataCorp Reference Manual, 2023). In line with Kennedy (2008), theoretical reasons for selected instruments to meet exclusion restrictions as a means to test whether instruments are uncorrelated with the error term, are adopted from discussions in **sections 2.3.3, 2.4.3,** and **3.3.2** based on exact identification strategy. For each regression model, the analysis considers the test statistic threshold and rule of thumb for Durbin-Wu-Hausman test, Stock and Yogo (2005), the Bound et al (1995) partial R-square, and the Shea's partial R-square (Shea, 1997).

At \$1.90/day poverty headcount, and with the lagged values of suspected endogenous sectoral value-added and labour productivity growth as well as structural change and sector productivity growth variables used as instruments, the robust and non-robust DWH test results are reported in Table 2.4a below for regression models without independent and interaction terms of IQ. The DWH test results show that the variables are exogenous (P-value > 0.05) in all of the specified sample regression models in Table 2.4a. For these models, the test results confirm that the pooled OLS regression estimator is considered more consistent and efficient and hence preferred to the instrumental variable regression estimator. The outcomes of these test results are consistent with the treatment of sectoral growth components in other studies (Ravallion and Chen, 2007; Loayza and Raddatz, 2010; and Pham and Riedel, 2019) which identified and treated sectoral growth components as exogenous regressors.

For validity of instruments, Table 2.4a shows that the Stock and Yogo (2005) t-value ≥3.2 and F-statistic ≥10 thresholds and/or conditions for the very small differences between partial R-square and Shea's partial R-square test statistics in the first-stage regressions are satisfied for all the sample models and regressors presented in table. This shows that the instruments used are valid and are adequate to largely explain the endogenous variables. Similar results are obtained at \$3.20/day poverty headcount. While the independent sectoral compositions of growth presented in Table 2.4a above are found to be exogenous, the study used Absolute Latitude for institutional quality (IQ) and its corresponding terms of interactions with sectoral growth as instruments in models with terms of interaction between IQ and measures of sectoral growth. The results are presented in Table 2.4b below.

Table 2.4a: Test for Endogeneity and Instrument Validity for Models without IQ Terms at $1.90 per Day Poverty Headcount

	Global Sample Sectoral Value-added Growth			**Global Sample Labour Productivity Growth**			**Global Sample Structural Change & Sector Productivity Growth**	
*Robust Durbin-Wu-Hausman (Durbin, 1954; Wu, 1973; & Hausman, 1978) Test of Endogeneity (using the option **vce(robust)** followed by **estat endogenous** Stata commands)*	Ho: variables are exogenous Robust score chi2(3) = **1.83775 (p = 0.6068)** Robust regression F(3,110) = **0.510032 (p = 0.6762)**			Ho: variables are exogenous Robust score chi2(3) = **0.666544 (p = 0.8810)** Robust regression F(3,108) = **0.208294 (p = 0.8905)**			Ho: variables are exogenous Robust score chi2(2) = **2.0728 (p = 0.3547)** Robust regression F(2,112) = **1.01005 (p = 0.3675)**	
*Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)*	Ho: variables are exogenous Durbin (score) chi2(3) = **(p =0.7174)** Wu-Hausman F(3,110) =**(p = 0.7436)**			Ho: variables are exogenous Durbin (score) chi2(3) = **(p =0.8085)** Wu-Hausman F(3,108) = **(p = 0.8319)**			Ho: variables are exogenous Durbin (score) chi2(2) =**(p=0.3061)** Wu-Hausman F(2,112) =**(p=0.3306)**	
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.8782**			**Prob>chi2 = *0.7367***			**Prob>chi2 = 0.3308**	
First Stage Regressions								
	HaYa	**HiYi**	**HsYs**	**HLPa**	**HLPi**	**HLPs**	**SC**	**SPG**
Instrumental variables								
Lagged value of sec value-added grt.	0.5083***	0.3536***	0.4959***					
	(0.0807)	(0.0782)	(0.0852)					
Lagged value of sec. labour Prod. growth.				0.1938***	0.3733***	0.4897***		
				(0.0739)	(0.0839)	(0.0836)		
Lagged values of SC & SPG							0.5747***	0.6271***
							(0.0740)	(0.0749)
Constant	0.0182	-0.0076	0.0797**	0.0044	-0.0450**	-0.0031	0.0342	-0.0680
	(0. .0172)	(0.0348)	(0.0355)	(0.0104)	(0.0216)	(0.0241)	(0.0269)	(0.0456)
Observations	121	121	121	121	121	121	121	121
R-squared	0.5252	0.3505	0.4165	0.5892	0.6011	0.6366	0.3944	0.5262
Test for Instrument Validity								
t-value for instrument	6.30	4.52	5.82	2.62	4.45	5.86	7.77	8.38
F-value	13.30	13.63	18.72	3.14	19.07	21.44	32.44	42.07
Prob > F	0.0000	0.0000	0.0000	0.0284	0.0000	0.0000	0.0000	0.0000
Partial R-Square	0.2609	0.2657	0.3320	0.0781	0.3401	0.3669	0.3627	0.4247
Shea's Partial R-Square	0.2300	0.1868	0.2349	0.0562	0.1525	0.1375	0.3534	0.4138

Robust standard errors in parentheses; and *** p<0.01, ** p<0.05, * p<0.1)

Note: *HaYa = Agricultural value-added growth; H_iY_i = Industry value-added growth; HsYs = Services value-added growth; HLP_a = Agriculture labour productivity growth; HLP_i = Industry labour productivity growth; HLP_s = Services labour productivity growth; SC = Structural change; and SPG = Sector productivity growth*

In Table 2.4b, the DWH test results with P-value > 0.05 largely rejects the endogeneity of IQ and its corresponding terms of interaction across regression models for the different sectoral compositions of growth (sectoral value-added and labour productivity growth, and structural change and sector productivity growth) in the global and SSA cross-country sample regression models. These test results confirm that the pooled OLS regression estimator is more consistent and efficient and hence preferred to the IV regression estimator for the specified models. In addition, looking at the t-statistics, F-statistics and corresponding significance, and the differences between partial R-square and Shea's partial R-square statistics statistics, the overall results reveal that the instruments used are valid/relevance and thus adequate to largely explain the endogenous variables. These results are similar to those obtained at $3.20/day poverty headcount.

Table 2.4b also shows tests results for measures of sectoral labour productivity growth regression models in the global sample with IQ and its interaction terms. There is evidence that the DWH test results with P-value < 0.05 do not reject the endogeneity issues of terms of IQ and its interaction with these measures of sectoral growth. The results confirm that instrumental variable regression estimator is more consistent and efficient, and so preferred. However, in the SSA cross-country sample regression model, the DWH test results revealed P-value > 0.05, hence largely rejects endogeneity issues and prefer the pooled OLS regression estimator as more consistent and efficient. In both cases however, the overall results for the t-statistics, F-statistics and corresponding significance, and the differences between partial R-square and Shea's partial R-square statistics reveal that the instruments used are valid/relevance and thus largely adequate to explain the endogenous variables.

The instrumental variable regression results for sectoral labour productivity growth models in the global sample with IQ and its terms of interaction with the measures of growth at both $1.90 and $3.20 per day poverty headcount is presented in Table 2.5 below. Across columns 1 to 4, the study finds that while the coefficients of independent sectoral labour productivity growth and the respective terms of interaction with IQ are largely negative, there is no evidence of statistically significant contributions of these terms to PR in the global sample.

Table 2.4b: Test for Endogeneity and Instrument Validity for Models with IQ

Test for Endogeneity and Instrument Validity for Sectoral Value-Added Growth Model with IQ at $1.90/day poverty headcount

	Model for Global Sample without Region Dummies				Model for Global Sample with Regional Dummies				Model for SSA Sample			
Durbin-Wu-Hausman (DWH) Test for Endogeneity & comparing OLS to IV regressions	Prob>chi2 = 0.5160				Prob>chi2 = *0.6294*				Prob>chi2 = *0.4208*			
First Stage Regressions												
Instrumental variables	IQ	IQ*HaYa	IQ*HiYi	IQ*HsYs	IQ	IQ*HaYa	IQ*HiYi	IQ*HsYs	IQ	IQ*HaYa	IQ*HiYi	IQ*HsYs
Latitude	6.265***				5.1380***				2.6203			
	(1.465)				(1.4729)				(3.3310)			
Latitude*(Agric V.ad grth)		2.2671***				3.9073***				5.8317**		
		(0.5901)				(1.0317)				(2.6645)		
Latitude*(Indus. V.ad grth)			-0.2398				-0.1173				6.3416**	
			(.8925)				(1.1968)				(2.5223)	
Latitude*(Serv V.ad grth)				5.4603***				7.8429***				17.1557***
				(1.9950)				(2.2347)				(3.9944)
Constant	-9.087***	-0.0393***	-0.1061***	-0.2652***	-16.832***	-0.0685***	-0.1735***	-0.4281***	-13.561***	-0.0648	-0.1482**	-0.4055***
	(2.551)	(0.0149)	(0.0386)	(0.0845)	(3.3253)	(0.0201)	(0.0541)	(.1140)	(3.7086)	(0.0497)	(0.0694)	(0.1359)
Observations	162	162	162	162	162	162	162	162	42	42	42	42
R-squared	0.562	0.7530	0.4093	0.5085	0.6762	0.8032	0.4935	0.6103	0.8334	0.8226	0.5628	0.8481
Test for Instrument Validity												
t-value for instrument	4.27	3.84	-0.27	2.74	3.49	3.79	-0.10	3.51	0.79	2.19	2.51	4.29
F-value	12.68	6.14	2.14	8.00	11.0	5.31	0.57	7.39	5.66	2.17	2.25	6.60
Prob > F	0.0000	0.0001	0.0781	0.0000	0.0000	0.0005	0.6861	0.0000	0.0016	0.0969	0.0867	0.0006
Partial R-Square	0.2527	0.1406	0.0541	0.1759	0.2452	0.1359	0.0166	0.1797	0.4299	0.2242	0.2311	0.4681
Shea's Partial R-Square	0.0454	0.1678	0.0051	0.1788	0.1807	0.1513	0.0071	0.2555	0.5483	0.2411	0.2676	0.5790

Test for Endogeneity and Instrument Validity for Sectoral Labour Productivity Growth Model with IQ at $1.90/day pov. headcount

Durbin-Wu-Hausman (DWH) Test for Endogeneity & comparing OLS to IV regressions	Prob>chi2 = 0.0033				Prob>chi2 = 0.0173				Prob>chi2 = 0.3641			
First Stage Regressions												
Instrumental variables	IQ	IQ*HLPa	IQ*HLPi	IQ*HLPs	IQ	IQ*HLPa	IQ*HLPi	IQ*HLPs	IQ	IQ*HLPa	IQ*HLPi	IQ*HLPs
Latitude (Latit)	4.6298***				4.2212***				6.7126***			
	(0.7733)				(0.8311)				(1.6656)			
Latit*(Agric L. Prod grth)		1.9875***				3.7997***				5.4550***		
		(0.5862)				(0.9481)				(1.9597)		
Latit*(Indus. L. Prod grth)			0.7492				1.0777				7.2020***	
			(0.6726)				(0.8359)				(1.7698)	
Latit*(Serv. L. Prod grth)				1.7900**				3.5505***				9.1498***
				(0.7841)				(0.8740)				(1.5211)
Constant	-11.326***	-0.0349***	-0.0619***	-0.0660**	-16.021***	-0.0391***	-0.0633**	-0.0849***	-18.127***	-0.0769**	-0.0418	-0.1534***
	(1.8259)	(0.0095)	(0.0205)	(0.0287)	(2.2142)	(0.0118)	(0.0261)	(0.0342)	(3.1674)	(0.0327)	(0.0406)	(0.0502)
Observations	162	162	162	162	162	162	162	162	42	42	42	42
R-squared	0.5329	0.6928	0.3402	0.3565	0.6154	0.7348	0.4057	0.4867	0.8174	0.8334	0.7307	0.7859
Test for Instrument Validity												
t-value for instrument	5.99	3.39	1.11	2.28	5.08	4.01	1.29	4.06	4.03	2.78	4.07	6.02
F-value	10.10	3.81	0.89	4.52	9.48	4.58	1.14	6.93	7.64	2.93	5.84	11.39
Prob > F	0.0000	0.0056	0.4698	0.0018	0.0000	0.0017	0.3422	0.0000	0.0003	0.0383	0.0015	0.0000
Partial R-Square	0.2145	0.0935	0.0236	0.1089	0.2219	0.1210	0.0330	0.1724	0.5219	0.2952	0.4547	0.6194
Shea's Partial R-Square	0.0291	0.0238	0.0032	0.0246	0.0535	0.0183	0.0039	0.1018	0.5286	0.3396	0.4581	0.6185

Test for Endogeneity and Instrument Validity for Structural Change (SC) and Productivity Growth (SPG) in IQ Models at $1.90/day

Durbin-Wu-Hausman (DWH) Test for Endogeneity & comparing OLS to IV regressions	Prob>chi2 = 0.0796			Prob>chi2 = 0.1229			Prob>chi2 = 0.6442		
First Stage Regressions									
Instrum. variables	IQ	IQ*SC	IQ*SPG	IQ	IQ*SC	IQ*SPG	IQ	IQ*SC	IQ*SPG
Latitude (Latit)	4.8884***			4.7313***			6.848***		
	(0.7465)			(0.7165)			(1.812)		
Latit*(Structural change)		1.8301***			2.7535***			6.508***	
		(0.6317)			(0.7680)			(2.0606)	
Latit*(Productivity grwth)			-0.3446			0.4990			7.267***
			(0.6132)			(0.6703)			(1.578)
Constant	-10.781***	-0.0670	-0.1365	-16.241***	-0.1200***	-0.1932***	-19.347***	-0.280***	-0.170**
	(1.8977)	(0.0263)	(0.0473)	(2.1106)	(0.0324)	(0.0544)	(2.8907)	(0.082)	(0.0826)
Observations	162	162	162	162	162	162	42	42	42
R-squared	0.5135	0.4771	0.3491	0.6524	0.5421	0.5012	0.8081	0.6608	0.6751
Test for Instrument Validity									
t-value for instrument	6.55	2.90	-0.56	6.60	3.59	0.74	3.78	3.16	4.60
F-value	15.01	4.44	3.58	18.27	5.54	3.47	9.23	5.38	9.36
Prob > F	0.0000	0.0051	0.0153	0.0000	0.0013	0.0179	0.0002	0.0041	0.0001
Partial R-Square	0.2285	0.0806	0.0661	0.2784	0.1048	0.0683	0.4640	0.3352	0.4673
Shea's Partial R-Square	0.0040	0.0041	0.0011	0.0457	0.0349	0.0116	0.4935	0.4087	0.5512

Robust standard errors in parentheses; and *** p<0.01, ** p<0.05, * p<0.1)

Note: *HaYa = Agricultural value-added growth; H_iY_i = Industry value-added growth; HsYs = Services value-added growth; HLP_a = Agriculture labour productivity growth; HLP_i = Industry labour productivity growth; and HLP_s = Services labour productivity growth; SC = Structural change; and SPG = Sector productivity growth; and IQ = Institutional Quality*

Table 2.5: IV Regression Results for Sectoral Labour Productivity Growth for Models with IQ Terms in the Global Sample

Dependent Variables: Δlog \$1.90/day ($\Delta loghc\_19_{it}$) and Δlog \$3.20/day ($\Delta loghc\_32_{it}$) poverty headcount measures				
	IV Models with IQ at *\$1.90/day poverty headcount*		**IV Models with IQ at *\$3.20/day poverty headcount***	
Explanatory variables	Model 1	Model 2	Model 3	Model 4
Agriculture Lab. Productivity growth	-15.14		-7.551	
	(21.25)		(13.62)	
Industry Lab. Productivity growth	0.157		-2.259	
	(11.97)		(8.735)	
Services Lab. Productivity growth	-4.290		-1.931	
	(2.940)		(1.702)	
Agriculture Lab. force expansion	-14.01	-18.50	-7.277	-10.04
	(17.98)	(43.76)	(12.50)	(29.12)
Industry Lab. force expansion	-0.813	-1.348	-1.689	-0.872
	(6.471)	(10.98)	(4.731)	(7.238)
Services Lab. force expansion	-2.159	-3.115	-1.365	-2.330
	(2.702)	(3.108)	(1.891)	(2.000)
Institutional Quality (IQ)	0.114	0.102	0.0480	0.0504
	(0.127)	(0.151)	(0.0853)	(0.102)
(Agriculture Lab. Product. growth) * IQ	-15.70	-21.71	-8.124	-12.05
	(21.32)	(43.77)	(13.82)	(28.97)
(Industry Lab. Product. growth) * IQ	1.689	-6.545	-2.930	-4.372
	(22.96)	(42.68)	(17.46)	(28.38)
(Services Lab. Product. growth) * IQ	-9.456	-6.372	-3.815	-3.053
	(9.269)	(4.980)	(4.978)	(2.881)
Agric Lab. Product. growth*regional dummy variable				
East Asia and Pacific (EAP)		-31.86		-17.49
		(28.52)		(17.97)
Europe & Central Asia (ECA)		81.69		9.402
		(93.00)		(52.16)
Latin America & Caribbean (LAC)		-19.62		-14.05
		(63.36)		(41.13)
Middle East & North Africa (MENA)		-3.841		-4.472
		(12.07)		(6.763)
South Asia (SA)		-20.53		-9.675
		(52.82)		(34.65)
Sub-Saharan Africa (SSA)		-22.11		-11.96
		(48.94)		(32.30)
Industry Lab. Product. growth*regional dummy variab				
East Asia and Pacific (EAP)		-0.456		-0.815
		(26.39)		(17.53)
Europe & Central Asia (ECA)		-7.500		-20.69
		(25.77)		(12.73)
Latin America & Caribbean (LAC)		1.583		0.782
		(4.169)		(2.891)
Middle East & North Africa (MENA)		4.216		1.984
		(10.38)		(5.957)
South Asia (SA)		1.894		-1.178
		(38.37)		(25.58)
Sub-Saharan Africa (SSA)		-3.702		-2.822
		(18.84)		(12.44)
Services Lab. Product. growth*regional dummy variab				
East Asia and Pacific (EAP)		-5.820		-2.939
		(4.882)		(2.736)
Europe & Central Asia (ECA)		-10.14		26.11
		(34.85)		(16.49)
Latin America & Caribbean (LAC)		-1.107		-1.300
		(1.773)		(1.083)
Middle East & North Africa (MENA)		-8.901		-3.914
		(14.85)		(9.383)
South Asia (SA)		-5.153		-1.452
		(14.35)		(9.572)
Sub-Saharan Africa (SSA)		-5.480		-3.013
		(7.591)		(5.056)
Change in Inequality (dGini)	2.007	2.684	1.457	1.658
	(1.423)	(2.788)	(1.005)	(1.873)
Initial Gini (InsGini)	0.0655	0.0127	0.0107	0.00736
	(0.110)	(0.123)	(0.0684)	(0.0758)
Initial life expectancy	-0.272	-0.168	-0.176	-0.153
	(0.346)	(0.596)	(0.246)	(0.380)
Constant	1.177	0.722	0.732	0.646
	(1.392)	(2.372)	(0.996)	(1.515)
Observations	162	162	162	162

Robust standard errors in parentheses; and *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: *Regional dummy variables are included in the models in the second and fourth columns*

Instruments: *Absolute Latitude, interaction terms of latitude and each of the sectoral labour productivity growth*

3.5 Conclusion and Policy Recommendations

Empirical studies on the poverty-reducing effect of growth generally show that aggregate growth contributes to but is not sufficient for poverty reduction (PR). The literature also argues that the extent of poverty-reducing effect of growth may vary across the sectoral composition of economic growth. The huge literature on the contribution of aggregate and its sectoral compositions to PR have recommended appropriate policy and institutional environment to address the constraints affecting the poverty-reducing effect of growth. Despite the limited contribution of the impressive growth to PR in SSA, **no** rigorous empirical study examines the extent to which the level of institutional quality (IQ) influences the translation of sectoral composition of growth and structural change (SC) into PR in that region.

The current study investigates the effect of IQ and sectoral compositions of growth and SC on PR, and the extent to which IQ influences the translation of sectoral compositions of growth and SC into PR at global level and in SSA relative to other regions. While it employs Pooled OLS and 2SLS estimations, it uses data on sectoral growth, SC, poverty, IQ, and other control variable from respectively GGDC, PovcalNet, World Governance Indicators, and various control variable databases for the period 1990-2018.

Consistent with literature, this study has shown the negative and statistically significant effects of services and agriculture value-added and the corresponding labour productivity growth, as well as structural change and sector productivity growth on poverty at global level. However, while literature revealed evidence of relatively high significant contribution of agriculture sector to PR than non-agriculture sectors, this study reveals contrary evidence of insignificant effects of agriculture value-added and labour productivity growth on PR in SSA, despite the concentration of the larger proportion of the region's population in the sector. This as emphasised in literature is due to the limited impact of public expenditure on applying scientific innovations, including irrigation, for improved and high-yielding crop varieties to transform rural communities in Africa, and the heterogeneous production environments. It is as well because of the unsuitable agroecologically growing conditions for inputs, and the relatively high cost of those inputs with low farmgate prices received for output in the region (Cramer et al., 2020; Ogundari and Bolarinwa, 2018; and Porteous, 2020). It is also due to limited agricultural research programmes and scientific knowledge about the infrastructure and crops mixes that are particularly important in Africa (Cramer et al., 2020; and Gollin, Hasen, and Wingender, 2018). Notwithstanding, most African countries are engaged in free trade of export crops, leading to the decline in food grains availability and growth rate, and hence contribute to the low per capita output (Patnaik, 2016; and Traore and Sakyi, 2018). Moreover, while the more efforts to provide credit and extension services to improve the productivity of smallholder farms in SSA, there is limited evidence of impact of the work of extension officers on improving agricultural productivity of these farms in Africa (Bernstein et al., 2019; and Cramer et al., 2020).

Thus, to achieve sustained agricultural production and productivity in SSA, this study recommends the adoption of best practices in cultivation and enhancement of capacity of farmers for increased access to and adoption of modernized farming and high yield varieties that positively respond to modern implements. These will serve as attractive accelerators for increased public and private sector demand to investment in irrigation and water management to acceptable levels, despite the argument that such adoption rate in SSA is low compared to global level. While limited farmland is utilised by farmers compared to the vast cultivable land available in SSA, governments of countries in this region should encourage smallholder and commercial farmers to increase the proportion of farmland cultivated with different varieties developed through modern crop-breeding techniques, to improve production and productivity. Since technological advancement is low in SSA countries relative to countries in other regions, governments should provide resource support to actors and create the enabling policy and institutional environments that encourage investments in agricultural research and development for instance to enable the development of large numbers of new varieties for rapid rates of diffusion.

Analysed in this study also, is the role of structural change, recognised in literature as the main economic transformation channel for sustained growth and rapid PR. It is generally known in theoretical terms to be associated with movement of shares of labour employed from low productivity agriculture sector to high productivity industry sector. However, this study reveals insignificant effects of manufacturing/industry value-added and labour productivity growth on PR at global level, as well as insignificant effect of structural change and industry value-added and labour productivity growth on PR across regions including SSA. This might be due to analysis of evidence in this study presented in A**ppendix 2E**. The analysis shows consistent reductions in the average shares of real value-added, and labour employed in agriculture, and the corresponding increase in the shares of these dimensions for the services sector, while the corresponding shares of same dimensions for the manufacturing/industry sector seems to be relatively stagnated over the study period across regions, especially SSA. In line with others (McMillan and Rdrik, 2011; Chuhan-Pole, 2014; and Berardi and Marzo, 2017), such evidence of pre-mature de-industrialization has limited the contributions of manufacturing/industry sector growth and structural change to PR in SSA, despite emphasised in literature that the industry sector substantially contributed to the rapid growth through extractive primary commodity exports. Others have argued that it is a vulnerable employment that is absorbed into the non-agricultural sectors from the agriculture sector through and concentrated in the informal and weak productivity services sector, thereby constraining the positive contribution of structural change to average labour productivity growth, and hence limit growth impact on PR (McMillan and Rdrik, 2011; Page and Shimeles, 2015; Diao et al., 2019; and Adegboye and Ighodaro, 2020).

There is also a lack of required infrastructure, human capital, technical skills and innovations, and the level of private sector investment and participation to establish a high value-addition productivity extractive industries in Africa. In addition to the poor performance of schools and graduates in terms of decline in literacy and numeracy levels, the shortage of TVET equipment and qualified staff for in-demand skills and occupation training, and the limited collaboration between TVET institutions and the employers have caused a mismatch between the demand for and supply of skilled labour, and thus reduced the learning ability of youth to adapt to changes in the pattern of labour demand (Filmer and Fox, 2014; and OECD, 2018; and Yamada et al., 2018).

In response to these challenges for improved structural change and productivity of the manufacturing/industry sector and the corresponding contributions to sustained growth and PR, this study recommends based on findings and evidence in literature. For instance, this study recommends in line with Cramer et al. (2020) for developing countries including SSA to focus their industrial policy on increased manufactured exports demand as a productive force to influence investment incentives that are clearly associated with increasing returns, direct and indirect generation of employment as well as foreign exchange. Government should thus enhance such industrial policy by supporting investments in the sector that generate foreign exchange earnings, that are characterized by the potential for increased labour productivity, creating employment, and helping address the need for a non-inflationary supply of basic wage goods. While focusing on these rapid rates of growth of export volumes and earnings, governments should also design investment strategies to stimulate the rapid rate of growth of imports, especially of producer inputs and capital goods that incorporate an effective exchange rate policy relevant for acceleration of sustained growth and structural change.

Moreover, the evidence is clear that more poor people are concentrated in the non-farm activities across regions including SSA while also emphasised as recommended above, the priority of government/public led investments for increased imports and exports rates for enhanced growth and structural change. To create a balance for increased PR in Africa, this study recommends policies designed to promote investments in economic activities with increased demand for unskilled and less educated non-farm labour (including women and youth) in higher productivity activities as well as wage-labour-intensive goods and services for increased export growth and foreign exchange earnings. As a pathway to sustainability, government should develop and build the capacity of institutions for enhanced monitoring and performance of firms towards meeting their targets for exports, investment, employment, and productivity; and promotion of non-inflationary supply of basic food and wage goods to maintain political stability and protect welfare and profitability of firms from potential rise in wages to meet rising cost of basic living.

Additionally, government should create an enabling environment attractive to the rapidly growing youth population for efficient allocation of resources across sectoral supply chains. Indeed, this study recommends in line with others (Allais, 2012; and Camer et al., 2020) that while young people look forward to having access to sufficient information on the labour market, employers should play key role in developing new and improved set of relevant TVET and entrepreneurship training and qualifications for young people to invest in obtaining these needed qualifications and skills to enhance their employability. Besides, while Climate Change coupled with environmental degradation, through shocks such as flooding and storms destroys capital and disrupt supply chains, remain urgent issues decreasing firm and worker productivity, it is important to understand how firms can be resilient to adapt against these shocks. This is necessary to maintain productivity growth through channels that allow economic transformation to drive more productive and higher earning work in the face of these negative shocks. Hence the prioritisation of the need for strategies to enhance structural transformation through the adoption of technological and indigenous idea generated innovations in firm capabilities, improving the functioning of markets, and integrating firms in low- and middle-income countries within the global value-chains and world markets.

While there is no previous evidence on the influence of IQ, through direct introduction of the interaction term in the model, on the poverty-reducing effects of sectoral components of EG, this study contributes to the literature in that direction. The study clearly demonstrates that the weighted average IQ and its dimensions, especially Regulatory Quality (RQ), Government Effectiveness (GE), Control of Corruption (CC), Voice and Accountability (VA), and the Rule of Law (RL) in one way or the other enhance the sectoral compositions of growth and significantly influence their poverty-reducing effects at global level and across regions including SSA.

For instance, findings show that IQ significantly enhances the poverty-reducing effects of services and agriculture value-added growth, while it significantly enhances moderate poverty-reducing effects of industry value-added growth. RQ and GE significantly enhance poverty-reducing effects of agriculture labour productivity growth at critical threshold. Across regions, IQ significantly enhances poverty-reducing effects of services value-added growth in South Asia and SSA. RQ and CC significantly enhance the poverty-reducing effect of services labour productivity growth at all levels of RQ and CC in South Asia, but at critical thresholds in other regions including SSA. Also, VA significantly enhances the poverty-reducing effect of agriculture value-added growth, while VA and RL significantly enhance the poverty-reducing effects of industry value-added at critical thresholds across regions including SSA. However, while at least two institutional dimensions enhance the poverty-reducing effects of other measures of growth compositions, only VA institutional dimension significantly influenced the poverty-reducing effect of structural change, not at global level, but across regions, especially in EAP and at critical thresholds in other regions including SSA. This reveals the extent to which the outlined factors above are constraining the poverty-reducing effect of structural change.

Such good governance combination and independent influence on the poverty-reducing effects of the various sectoral compositions of growth require an integrated government reform framework that responds to diverse governance and institutional concerns. Such a response could be through efficient and accountable delivery of public goods and services including those that are pro-poor as ways of government accountability. This might be through re-allocation of resources to invest in human capital, in increased relative equal rights and access to services and empowerment, and increased access of the poor to potential resources for increased employment/job opportunities that encourage the participation of people including the poor in the growth process. It might also be through the protection of property rights, efficient rule of law, and effective anti-corruption policies and democratization, which together or independently promote less costs in market transactions (including low-cost contracting) and support private sector initiatives and investments as well as new/advanced technological talent and innovation/creativity.

This study, like other literature, therefore, calls for inclusive institutional and policy reforms, in developing countries, including SSA, for effective participation of the poor in the process and benefits of services and agriculture sector growth. While the services sector is swollen by informal employment in the SSA region, the reforms should focus on policies and institutions that attract increased public and private sector investments in rural infrastructure and skills capacity building of non-farm employees and farmers (in appropriate farming technologies). Moreover, the reforms should also encourage steady state accumulation of human capital (education and skills training) that drives long-run income and the growth of sectors, such as through diversification into farm-related services and industry activities supported by adoption of improved production and processing techniques. This allows interdependence among sectors, stimulating demand for and production of industry-related agricultural commodities, thereby enhancing agricultural transformation into modern activity. The reform environment should encourage efficient taxation, accountable and transparent natural resource governance, and management of effective public spending in sectors that largely contribute to PR. Moreover, reforms should focus on policies and interventions that promote Private Sector Development (PSD) as a driver for improved productivity and structural transformation. This can be achieved by addressing constraints to PSD through enhancing the enabling environment for creating and sustaining new businesses, increasing access to finance, improving access to market, attracting trade and foreign direct investment, and increasing human capital.

Additionally, even though the aggregate and sectoral growth rate of employment expansion or labour force participation are generally important for PR, both the growth rates of income inequality and population are found to contribute to poverty and hence dampen the contributions of sectoral compositions of EG to PR. This means that any efforts to enhance the contribution of EG or its composition to PR should also prioritise addressing unemployment and income inequality issues, especially focusing on policies that affect both EG and income inequality as a pathway to striking balance between the two that does not hot the poor. Also, while human capital, measured by initial life expectancy, is found to play a critical role in PR, its incorporation in the models proved very important in strengthening the contributions of sectoral compositions of growth to PR. Thus, development efforts towards enhancing the quality of institutional environment and the growth rates and contributions of sectoral compositions of EG should also consider addressing the factors that influence improvement in life expectancy gains, while employing mechanisms for reduction in total fertility rate. These may include development interventions for improved healthcare including reproductive health services for leveling fertility rate, access to safe water and hygiene as well as living conditions, food and nutrition intake, education (especially female education and gender empowerment), socio-economic status, early childhood development, advances in medicine and medical technology, and reduction in inequality of all forms.

Moreover, while poverty and EG data issues continue to pose challenge in empirical studies, future research should focus on the contribution of sectoral growth to other monetary measures of poverty such as the poverty gap and squared poverty gap, non-income dimensions of poverty and the channels through which human development and private sector growth including its financial development affect PR. Notwithstanding, studies should consider the development and use of empirical models that account for the reduction in the contributions of increased growth rates of population and income inequality to poverty.

CHAPTER FOUR: INSTITUTIONS, PRODUCTIVE ENTREPRENEURSHIP, AND POVERTY REDUCTION: GLOBAL EMPIRICAL EVIDENCE WITH FOCUS ON AFRICA

Abstract

The study investigates the effect of Productive Entrepreneurship (PE) on Poverty Reduction (PR) and the extent to which Institutional Quality (IQ) enhances the contribution of PE to PR at the global level and in Africa relative to other regions. It uses Pooled OLS and Two-Stage Least Squares estimations on dataset for the period 2002-2020. For regression models without IQ terms, findings show that the effect of PE on poverty in non-regional dummy model regressions is negative as expected and statistically significant at the global level. For regional dummy models without IQ terms, the effect of PE on poverty is negative and statistically significant across regions including Africa. For regression models with IQ terms, findings show that the effect of IQ on poverty in the global and African samples, and the effect of the terms of interaction between PE and IQ in the global sample model with non-regional dummies are negative and statistically significant. The influence of IQ on the poverty-reducing effect of PE is due to all other dimensions of IQ except political stability and absence of violence. In the global sample models with regional dummies and IQ terms, the effect of the interaction terms for PE and IQ is negative but insignificant. However, in similar regional dummy models, the effects of the interaction terms for PE and each of regulatory quality (RQ) and voice and accountability (VA) on poverty are each negative and statistically significant in especially Africa and South Asia. These poverty-reducing effect of PE occurs at all levels of VA and RQ in these regions. Moreover, similar effects are observed at critical values of VA and RQ in the Middle East, Latin America and Caribbean, and Europe and Central Asia. Overall, the poverty-reducing effect of PE is larger in a high-quality institutional environment.

4.1 Introduction and Background of the Study Chapter

Economic growth (EG) continues to be recognised as an important source of rapid poverty reduction (PR). While the factors of production are generally considered important for increased EG, the trickle-down theory emphasised that the benefits of increased EG is directly associated with rapid PR (Kuznets, 1995; Aghion and Bolton, 1997; and Olaoye et al., 2022). Empirical evidence also supports the significant effect of EG on PR (Ravallion and Chen, 1997; Dollar and Kraay, 2002; Adams, 2004; Kalwij & Verschoor, 2007; Ravallion and Chen, 2007; Christiaensen et al., 2011; and Fosu, 2015, & 2017). While very important, evidence shows that aggregate EG may be insufficient for rapid PR if not inclusive and sustained for the long-term (Besley and Burgess, 2003; Mulok et al., 2012; Bicaba et al., 2015; Sembene, 2015; and Adeleye et al., 2020). This resonates with the situation in African countries, especially those in Sub-Saharan Africa (SSA), experiencing low-income elasticity of poverty, despite its impressive annual real value-added growth rate of 4.5%, which is only second to South Asia at 6.3% over the period 2000-2018 (Korsu and Ndiaye, 2021). Such relatively large growth rate has only proportionately reduced extreme poverty by an annual rate of 1.3% from 1990 to 2015 (Beegle and Christiaensen, 2019; and Foresight Africa, 2020). Besides, it is only expected to reduce poverty from 47.9% in 2010 to about 27% in SSA, which is by far above the 3% of the Sustainable Development Goals target for ending poverty in 2030 (Bicaba et al., 2015). This questions the extent to which aggregate growth is sustained and inclusive in Africa. Nonetheless, sources argued that the composition of growth, including factors of production matters for inclusive and sustained EG and PR.

Following the endogenous growth theory of Romer (1986) and the theory of entrepreneurial knowledge spillover (Knight, 1921; Schumpeter, 1934; Kirzner, 1973; and Audretsch, 1995), knowledge, known as entrepreneurship capital, is an endogenous factor of production. In line with these theories, Baumol (1990 and 1993) emphasised the important role of entrepreneurship talent in better explaining long-run growth process. Other theoretical concepts from various sources (UNDP, 2005; Hassan et al., 2006; Hood, 2007; and Babajić and Nuhanović, 2021) also argue that the achievement of development outcomes such as sustained and inclusive EG and PR at all levels depend on competitive private sector development (PSD). Accordingly, Okey (2015) and Ruhashyankiko and Yehoue (2006) in describing the private sector, identified entrepreneurship including the creation of small and medium enterprises (SMEs) as a major component of PSD, which largely contributes to sustained economic growth.

Entrepreneurship has been defined differently in literature and based on which others (Wennekers and Thurik, 1999; UNCTAD, 2004; Audretsch et al., 2006; GEM, 2007; Carree and Thurik, 2003 & 2010; and Avanzini, 2011) have argued that entrepreneurship essentially deals with the behavioural characteristics and activities of individuals. This indicates that entrepreneurship is a multidimensional concept that lacks a unified measure that is appropriate enough to link its effect from individual level to macro level development outcomes. Based on Wennekers and Thurik (1999) and Carree and Thurik (2003; & 2010) who also built on the work and theories of others (Knight, 1921; Schumpeter, 1934 & 1942; Kirzner, 1973; Hébert and Link, 1989; Baumol, 1990; Lumpkin and Dess, 1996; and Naudé, 2011), this study adopts the below definition of entrepreneurship such that:

It is the ability and willingness of individuals or group of individuals to perceive and innovate/create new profitable economic opportunities and to introduce their ideas in the market, in the face of risks, uncertainties and other obstacles, by making sound management decisions on owned firm/business location, form, and the mobilisation and use of resources and institutions.

The new economic opportunities as defined include new products, new production methods, new organizational schemes, and new product-market combinations.

Generally, entrepreneurship as a PSD initiative in market-oriented economies contributes to sustained EG, rapid PR, and improved standard of living (Wennekers & Thurik, 1999; Audretsch and Thurik, 2000; AfDB, 2011; IFC, 2011; & 2013; European Union, 2012; Kritikos, 2014; and Desai, 2017). As the sources argued, these are achieved by stimulating economic activities through the promotion of increased capital investment, and productive employment/job creation via new market entry of entrepreneurial ventures and the formalisation of the informal sector. Additionally, while accelerate incomes and wages, entrepreneurship also facilitates innovative competition with new and existing businesses, which increases productivity and efficiency in production processes and hence reduced prices. Moreover, it generates increased tax revenue to support public services for improved standards of living.

Despite its importance for increased economic growth and PR, literature reviewed in this study reveals inconclusive empirical evidence on the effect of entrepreneurship on growth and PR. From this review it may be concluded that these controversies are largely due to the differences in the types/measures of entrepreneurship and sources of data used. The common measures of entrepreneurship used across empirical studies include Self-employment from the World Bank World Development Indicator (WDI) and National/International Statistical Labour Institution Databases (Beck et al., 2005; Tamvada, 2010; Kadarusman, 2020, and Van Le et al., 2022) and New Registered Business Formation Density/Rate (Audretsch et al., 2015; Zaki and Rashid, 2016; Djankov et al, 2019; Aziz et al., 2020; Adenutsi, 2023; and Ajide and Dada, 2023) from the World Bank Entrepreneurship Survey database. Other very important measures/types of entrepreneurship with data from the Global Entrepreneurship Monitoring (GEM) Database (Bampoky et al., 2013; Aparicio et al., 2016; Ferreira et al., 2017; and Bosma et al., 2018; Kim et al., 2022) include Total Early-stage Entrepreneurial Activity (TEA) that constitute both registered and unregistered new businesses, Innovation/Creativity (including the use of new technology), Improvement-driven Opportunity-based Entrepreneurial Activity (IOEA), Necessity-driven Entrepreneurial Activity (NEA), and High Job Creation Expectation Rate (HJCER). See **section 4.3.3** for definitions of these entrepreneurship types and their operationalizations/measurements.

Indeed, a set of empirical studies (Van Stel et al., 2005; Audretsch et al., 2015; Adusei, 2016; Urbano and Aparicio, 2016; Ferreira et al., 2017; and Zouita, 2021) independently used in their studies: overall TEA, IOEA, HJCER, and innovation, and strongly show positive and significant effects of entrepreneurship on EG. In contrast, Zaki and Rashid (2016) and Kadarusman (2020) used NBD and Self-employment respectively and find negative and statistically significant effects of entrepreneurship on EG. Similarly, recent empirical studies (Aziz et al., 2020; Afawubo and Noglo, 2021; Amorós et al., 2021; Ajide and Dada, 2023, and Azamat et al., 2023) used overall TEA and NBD and find significant effects of entrepreneurship on PR. Others also used Self-employment and NBD entrepreneurships and find insignificant effects of entrepreneurship on PR (Beck et al., 2005; Bonito et al., 2017; Djankov et al, 2019; and Adenutsi, 2023).

Moreover, some studies have examined the effect of entrepreneurship on both EG and PR (or improved human development). Indeed, Dhahri and Omri (2018) used overall TEA and found significant positive effects on both EG and human development. However, Gu et al. (2021) and Gebremariam et al. (2004) respectively used NBD and self-employment and find in both cases the significant positive effects on EG, but insignificant effects on human development and income PR in that order. Another study (Benghalem and Fettane, 2021) used NBD and finds no significant effects on both EG and PR (social development). The review thus reveals that while overall TEA and some of its components (IOEA, HJCER, and innovation) have consistently shown significantly positive and negative effects on EG and poverty respectively as expected, these controversies are mostly observed from the use of

NBD, self-employment, and other components of TEA (non-innovation entrepreneurships and NEA).

Despite the diverse measures of entrepreneurship, theoretical and empirical sources have identified a set of growth-oriented entrepreneurships (Wennekers and Thurik, 1999; Audretsch et al., 2004; Acs & Varga, 2005; and Baumol and Schilling, 2008). These include those involved in TEA in terms of new business/firm set-up and ownership, HJCER, IOEA, and innovative/creative entrepreneurship through which IOEA are often spotted and utilised. Evidence from recent empirical studies also support this (Audretsch et al., 2015; Adusei, 2016; Aparicio et al., 2016; Ferreira et al., 2017; Bosman et al., 2018; Kim et al., 2022).

While measured differently, there is a lack of evidence in the literature that uses a representative measure of growth-oriented entrepreneurship capturing the characteristics of actual behavioural activity-based entrepreneurial concepts and indicators. Moreover, empirical literature reviewed in this study show that measures of growth-oriented entrepreneurship are often used independently or in a combined/interaction form that is not representative of the theoretical definition of entrepreneurship adopted in this study. Indeed, Carree and Thurik (2003) and Van Le et al. (2022) argue that using one or a combination of two of these measures limits the estimated effect of entrepreneurship on EG and PR, since other remaining measured types/aspects are not capture.

While there is no definitive clarity on which of these measures of growth-oriented entrepreneurship is superior within and across countries and regions, there must be some characteristics that these measures may have in common, which are yet to be used in empirical studies. To address this gap in literature, this study is therefore the first to employ a weighted average indicator or variable referred to as Productive Entrepreneurship (PE), which captures such common features of the different growth-oriented entrepreneurships mentioned in literature. Concurrently, PE is a variable or indicator that represent the weighted average of the different growth-oriented entrepreneurships variable or indicators, which is derived using Principal Component Analysis (PCA) on data from the GEM database for the independent growth-oriented entrepreneurship measures. The PCA approach is much suitable to capture such common characteristics shared by the various measures, to examine the effect of entrepreneurship on poverty.

In addition to the types/measures of entrepreneurship, reviews also show that the inconclusive empirical evidence on the contribution of entrepreneurship to EG and PR depends on the levels of income and income distribution of economies, resource availability (human, infrastructure, and finance), and more importantly the quality of institutions and governance, and macroeconomic policy environment. Indeed, as identified in the entrepreneurship framework conditions by the Global Entrepreneurship Monitor (2016) and in UNCTAD (2004) and Eurostat of the EU (2012), limited human capital, financial, and infrastructure resources, largely affect business start-ups thereby reducing its effect on EG and hence PR. Also, high income inequality contributes to the evolution of poverty and hence reduces the poverty elasticity of entrepreneurship. Moreover, there are limited effects of entrepreneurial capital on PR in environments with high macroeconomic and political instability, and low quality of governance and institutions that matter for sustained EG.

There is also inconclusive empirical evidence over the level of income of economies as a determinant for the entrepreneurship effect on development outcomes. Some studies argue that the effect of entrepreneurship on EG, PR or welfare is significant in developed countries but insignificant in developing low- and middle-income countries (Van Stel et al., 2005; and Doran et al., 2018). However, Adusei (2016) and Ajide and Dada (2023) argue that entrepreneurship has significantly positive and negative effects respectively on EG and poverty in developing African countries. Moreover, while others (Tamvada, 2010; Jax, 2020; and Van Lee et al., 2022) also show significant effects of entrepreneurship on PR in India and Vietnam, Gebremariam et al. (2004) revealed insignificant effect of entrepreneurship on PR in West Virginia in the United States.

Furthermore, theoretical studies (Engerman and Sokoloff, 1997, 2002; Acemoglu et al., 2001 & 2002; Acemoglu and Robinson, 2012) and empirical evidence (Amorós, 2009; Klapper et al., 2010; and Urbano et al., 2019) emphasises institutional quality (IQ) and good governance as important determinants of EG and entrepreneurship. Other evidence shows that IQ is important for PR (Hassan et al., 2006; Tebaldi & Mohan, 2010; Perera & Lee, 2013; Doumbia, 2019; and Fagbemi et al., 2020), and for the poverty-reducing effects of entrepreneurship (Goel & Karri, 2020; Aziz et al., 2020; Si et al., 2020; and Gu et al., 2021). However, while there are differences in the effects of entrepreneurship on income and non-income poverty measures (Gebremariam et al., 2004; Dhahri and Omri, 2018; Benghalem and Fettane, 2021; and Gu et al., 2021), there is a lack of robust empirical studies on the moderating effect of IQ on income poverty-reducing effect of entrepreneurship. Moreover, despite the importance of IQ, the business environment in Africa is dominated by economic and political instability, inefficient tax systems, high corruption, and high legal/regulatory burdens (AfDB, 2011; Brennan & Fickett, 2011; IFC, 2013; Foresight Africa, 2020; and UNECA, 2020).

This study therefore investigates the effect of PE on income poverty, and of the moderating influence of IQ on the income poverty-reducing effect of PE at global level and in Africa relative to other regions. It employs Pooled OLS and two-stage least-squares (2SLS) instrumental variable estimations using data from various sources for the period 2002-2020.

This study contributes to the literature as follows:
Firstly, it is the first study to construct and use productive entrepreneurship as a precise measure of entrepreneurship that share common features of innovation, Improvement-driven Opportunity-based Entrepreneurial Activity, and High Job Creation Expectation Rate as growth-oriented entrepreneurships and hence account for multidimensionality as well as formal and informal and all forms businesses/firms. Secondly, there is inconclusive evidence on the level of income of economies as a determinant of the effect of entrepreneurship on development outcomes, and the lack of evidence in empirical literature on comparative regional analysis of entrepreneurship and income poverty relationships. Also, there is lack of evidence on the moderating effect of IQ on the effect of entrepreneurship on income poverty. This study demonstrates that the effect of PE on income poverty does not necessarily depend on the income level of economies, but largely on the extent to which the measure of entrepreneurship account for multidimensionality and theoretically growth-oriented dimensions. It also demonstrates that PE significantly contributes to income PR and that high IQ environment enhances the effect of PE on PR. Thirdly, evidence consistently remain unclear on the types of institutions that matter for measures of economic growth and its compositions such as entrepreneurship capital and for the effective translation of the measures of growth into improved development outcomes (Nallari and Griffith, 2011; Perkins et al., 2013; Curtis and Cosgrove, 2018; and Torvik, 2020). This study contributes to the literature on identifying, from the governance institutional cluster point of view, the types of institutional dimensions that matter for the moderating effect of entrepreneurship, especially PE on income PR. Finally, while PE and IQ are both potentially endogenous and other studies that employed 2SLS estimation method had often focused on the use of instruments for one endogenous variable to address endogeneity, this study demonstrates a better understanding of the use of multiple instruments in entrepreneurship-poverty models with at least two endogenous variables.

Findings show that, for regression models without IQ terms in non-regional dummy regression models, PE has a statistically significant effect on PR at the global level and in Africa. Similarly, in a regional dummy model without IQ terms, findings show that PE has statistically significant effect on PR across regions including Africa. Thus, while PE is a cluster of channels through which entrepreneurship contributes to development, It means that PE can have higher impact on PR in economies with larger proportion of entrepreneurs spotting opportunities and utilizing the opportunities to create and own/manage, through innovative ideas, new businesses/firms driven by increased independence and income or wealth, and with high growth-oriented employment expectation within the first five years and beyond.

For regression models with IQ terms, findings show that while IQ significantly contributes to PR as expected in the global and African samples, the effect of the term of interaction between PE and IQ on PR is statistically significant in the global sample. This indicates evidence of significant moderating influence of IQ on the poverty-reducing effect of PE, and that the effect of PE on PR is larger in a high IQ environment. Such statistically significant moderating influence of IQ on PE for PR is accounted for by all dimensions of IQ except political stability and absence of violence. In global sample regression with regional dummies and IQ terms, the effect of the term of interaction between PE and IQ on poverty is negative but statistically insignificant. However, the effects of the terms of interaction between PE and each of Regulatory Quality (RQ) and Voice and Accountability (VA) dimensions of IQ on extreme poverty are each negative as expected and statistically significant across developing regions especially Africa and South Asia. The moderating influence of especially RQ and VA institutional dimensions on the effect of PE on PR occur at all levels of RQ and VA, particularly in Africa and South Asia, while similar effects occur at critical threshold levels for IQ across all the regions, and for RQ and VA in the Middle East, Latin America and Caribbean, and Europe and Central Asia.

Control variables such as gross domestic capital formation and share of labour force in population are found to be important for PR in the study models. However, there is evidence of significant contribution of income inequality to poverty, thus seen as a key factor constraining the contribution of PE, as a component of EG, to PR.

This chapter covers introduction and background in Section 4.1, literature review with research questions/objectives in Section 4.2, the methodology in Section 4.3, results and discussions in Section 4.4, and conclusion and implications in Section 4.5.

4.2 Literature Review

4.2.1 Introduction

This section presents detailed discussions of the variety of literature reviewed for the current study. Empirical studies reviewed are generally found to have commonly used different data sources and types/measures of entrepreneurship to examine its effect on economic growth (EG) and poverty. The literature presented below is organized into sub-sections mainly on entrepreneurship-poverty and entrepreneurship-EG relationships, which are structured around the entrepreneurship types and the respective data sources used. Additionally, a section on the importance of institution for entrepreneurship and its contribution to economic development, and another on research questions and contribution to knowledge are also presented.

4.2.2 The Effect of Entrepreneurship on Poverty

Some recent studies have utilised various measures of TEA and its components with data from the GEM database and found statistically significant effects of entrepreneurship on PR (or improved human development). Indeed, Afawubo and Noglo (2021) used the overall measure of TEA data and employed GMM estimation method to examine whether entrepreneurship reduces poverty in122 developing countries for the period 2006-2016. They found significant and negative impact of entrepreneurship on all measures of poverty used (poverty headcount ratio and gap at the $1.90/day). The results remained similar even when the analysis was done by income levels of the study countries.

Amorós et al. (2021) in their study, used two-stage least squares (2SLS) instrumental variable (IV) estimation on overall TEA and its necessity-based entrepreneurial activity data as well as the UN-UNDP, Human Development Index (HDI) data for the period 2010–2019 to analyse the relationship between poverty (HDI) and entrepreneurial activity in developing countries. They tested the hypothesis that countries with a high pursuit of entrepreneurial activities reduce poverty, even if necessity-motivated entrepreneurship is developed. Their results showed that both overall TEA and necessity-based entrepreneurship have significant effects on PR in developing countries. Even in pandemic situations such as the Coronavirus disease (COVID-19) crisis, the study analysis identifies that people in developing countries were pushed into necessity entrepreneurship.

In investigating the impact of entrepreneurial activities on income inequality and human development (HD) among BRICS nations, Rani and Kumar (2021) employed Fixed- and random-effects estimations using a 12-year time series TEA data (2004–2015) for five

BRICS countries. They find that entrepreneurial activities have neutral impact on income inequality by keeping the difference in earnings between the rich and the poor constant. However, it does not only increase the income share of the rich (top one percent) but also increase the income share of the poor (bottom 50 percent) of earners among BRICS nations. They also found that entrepreneurial activities have a positive impact on HDI among the BRICS nations. Thus, while entrepreneurship increases the income share of both the rich and poor in the national income, the poorest population can also enjoy the benefits of economic growth, which result in more human development in these nations. In a sustainable development related study, Dhahri and Omri (2018) investigated the ability of entrepreneurial activity to enhance EG, environmental quality, and improved social development in 20 developing countries. Using Fully Modified Ordinary Least Squares (FMOLS), Dynamic Ordinary Least Squares Method (DOLS), and Vector Error Corrected model (VECM) techniques on overall TEA data for the period 2001–2012 they found that entrepreneurship positively contribute to EG, and social development as measured by modified human development index (MHDI) in these countries.

In addition, Ballesta et al. (2020) analysed the impact of the rates of innovative and necessity entrepreneurships on Human Development (MHDI) using related GEM data for the period 2002–2017. Employing pooled ordinary least squares (POLS) and panel corrected standard errors (PCSE) techniques, they found that innovative entrepreneurship has positive effects on MHDI. On the contrary, however, the necessity entrepreneurship did not significantly contribute to increased MHDI, since it is identified as a subsistence type of entrepreneurship. Like the study and findings by Ballesta and others, Venâncio and Pinto (2020) also used GEM data to examine the effects of the types of entrepreneurial activity on the achievement of different dimensions of sustainable development goals (SDGs). Analysing a sample of 67 countries using OLS, quantile egression (QR), and instrumental variable (IV) estimations for the period 2015-2018, they find that entrepreneurship (overall TEA) contributes negatively to the achievement of people and prosperity dimensions of SDGs. While opportunity-based and innovative entrepreneurships had each positive effects on these SDG dimensions, the negative effect of TEA was observed to be mainly due to necessity-based and non-innovative entrepreneurships.

In terms of utilization of the new business/firm formation density data from the World Bank Entrepreneurship Survey Database, one set of recent studies found that the effect of entrepreneurship on PR (improved HD) is statistically significant. Indeed, Aziz et al. (2020) employed OLS, panel fixed- and random-effects, as well as panel generalized least square estimations on data for the period 2005-2016 to investigate the contributions of entrepreneurial activity and business environment-oriented entrepreneurship facilitators to PR (improved HDI) in 104 countries across the world. They found a positive and significant effects of entrepreneurial activity on changes in HDI in all countries included over the study period. Findings also show that governance factor index as facilitator influenced the direct positive and significant effect of entrepreneurship on HDI, while the cost of doing business factor index influenced as expected, the direct negative and significant effect of entrepreneurship on HDI. Thus, arguing that increasing the cost of starting a business may demotivate entrepreneurs and reduces the impact of creating and registering new businesses on HDI.

Shirima (2021) also investigates the role of the private sector through entrepreneurship and innovation as a key strategy for PR using OLS estimation on data for 58 countries over the period 2001 to 2008. The study found that both measures contributed significantly to PR (measured in poverty headcount, gap ratio, and squared gap indices at $ 1.25/day) across geographical regions in the world. Moreover, the study reveals that poverty falls by a much larger magnitude when innovation (proxied by the number of patents applications submitted for registration) interacts with entrepreneurship (number of new enterprises registered). Similar study by Azamat et al. (2023) investigates the extent to which entrepreneurship and entrepreneurship development incentives (cost of starting a business and control of corruption) influence PR and help to improve the entrepreneurship environment in countries around the world. Using pooled OLS, and fixed- and random-effects estimations on data from 73 countries for the period 2016-2020, they found that entrepreneurship has a significant effect on PR (improved HDI). They also found entrepreneurship development incentives to increase the efficiency and capacity of entrepreneurial activities to reduce poverty. Furthermore, in examining the dynamics among entrepreneurship, EG, and poverty in Africa, Ajide and Dada (2023) employed GMM and Vector Autoregressive estimations on data from 18 African countries for the period 2006–2018. The study found a statistically significantly effect of entrepreneurship on PR in Africa. While they found bidirectional causalities between PR and EG as well as between EG and entrepreneurship in Africa, the causality moving from entrepreneurship to PR was said to be unidirectional.

On the contrary, other sets of literature that used the same new business/firm formation density data show statistically insignificant effects of entrepreneurship on poverty alleviation. In a study that attempts to disentangles the link between poverty headcount and business regulations and enforcement, Djankov et al. (2019) used country fixed-effects estimation on panel data for 189 economies for the period 2005-2013. They find that business-friendly regulations are correlated with lower poverty headcount, and that the association between poverty and new business formation as a measure of entrepreneurship is negative but statistically insignificant.

Also, in theoretically providing an insight into the role of entrepreneurship in job creation, income generation and empowerment, and poverty reduction in low-income economies, Adenutsi (2023) employed simple panel data least squares estimation and descriptive correlation analyses for the period 2014-2020. The study finds that entrepreneurship does not directly affect poverty at conventional statistical levels of significance. Only through the unemployment rate and real income per capita that entrepreneurship may reduce poverty, and even so, the impact is economically marginal. This reveals that mere increases in business density might not necessarily impact on PR but rather widen the income inequality and the poverty gap.

Another study conducted in China by Gu et al. (2021) explores the effect of innovation and registered business entrepreneurships and the moderation effects of business environmental index on economic growth and social development as dimensions of sustainable development. Using panel co-integration, Fully Modified OLS and Dynamic OLS methods on provincial data from 30 provinces over the period 2005 to 2016 they found that both innovation and business entrepreneurships significantly contribute to EG but have no significant effects on social development measured as MHDI (or PR). Yet, while the influence of business entrepreneurship on MHDI is not directly significant, its term of interaction with business environment index has a positive and significant effect on MHDI. Thus, concluding that a good business environment improves the rates of employment, and hence increases social welfare.

Furthermore, Benghalem & Fettane (2021) used the number of new business registered data from both the IMF and GEM databases for the period 2006-2017. They utilised balanced panel data random- and fixed-effects as well as 2SLS instrumental variable estimations to investigate the effects of entrepreneurship on both economic and social development in selected MENA countries. Findings show no evidence of a significant impact of entrepreneurship on economic and social development in the study countries.

With regards to the use of self-employment and other labour/employment share data as a measure of entrepreneurship, some studies have revealed the effect of entrepreneurship to be negative and statistically significant on poverty. For instance, Tamvada (2010) examines the returns to entrepreneurship using the per capita consumption expenditure as a standard measure of welfare in India. The study employed simultaneous quantile regressions across different quantiles of the distribution including the mean, and a micro data with sample of 26,485 households consisting of 13,782 household head that were economically active. The study found that employers, those entrepreneurs who also hire others, have the highest returns in terms of consumption, while the self-employed, those entrepreneurs who work for themselves, have slightly lower returns than the salaried employees. Also, own-account workers have a higher welfare level than casual labourers.

Built on recent studies suggesting the importance of self-employment for economic development, Goetz et al. (2012), using OLS estimation methods, examined the impact of self-employment on wage and salary employment growth across U.S. counties within the period 1980-2007. They found that self-employment has significant effect on wage and salary employment growth, and that the effects are more pronounced in urban than in rural areas. While employment first increases following the change in self-employment, the effect turns negative and then tapers off as the less-efficient firms are driven out. This suggests that while self-employment is important, the pipeline for new businesses needs to be well-supplied.

Another study by Slivinski (2012) used trend analysis and OLS on cross-sectional data from 50 American states to examine the link between high rates of entrepreneurship (percentage of the workforce that is self-employed) and declines in poverty in developed economies for the period 2001-2007. The OLS results show that for every one percentage point increase in the rate or share of entrepreneurship in a state, the poverty rate declined by more than two percentage points. For trend analysis the study found that the highest rates of entrepreneurship demonstrated the largest reductions in poverty over a 6-year period, while lower rates of entrepreneurship corresponded to increases in poverty.

Jaax (2020) in a study on private sector development effect, employed OLS and 2SLS IV estimations to examine the link between province-level changes in private firms' formal employment share and PR in Vietnam's provinces over the period 1999 to 2009. The study reveals that larger increases of private firms' employment share are associated with larger reductions in poverty. Moreover, evidence shows that multinational enterprises, rather than domestic private firms, emerge as drivers of the association identified in our analysis. A more recent and follow-up study in the same Vietnam by Van Le et al. (2022) used panel fixed effect, 2SLS and GMM estimations on provincial panel data for the period 2010–2019 to examine the role of private sector development in monetary and multidimensional poverty alleviation. They find evidence that increasing numbers in the workforce in the private sector as well as in domestic and multinational firms all have the effect of reducing both monetary and multidimensional poverty. The results are robust even after accounting for unobservable heterogeneity, simultaneity, and various important control variables, even though income inequality raises both measures of poverty.

Other studies have also used self-employment and other labour/employment share data as entrepreneurship and revealed evidence of its statistically insignificant effect on PR. Gebremariam et al. (2004) employed OLS and 2SLS estimations on annual time series data for the period 1980-2001 to assess the effect of small businesses on EG and poverty alleviation in West Virginia. They find that while a positive relationship exists between small businesses and EG, an autonomous impact of the relative size of small businesses on poverty rate was found to be mild and insignificant. This indicates that any strong inverse relationship existing between the incidence of poverty and small businesses is through EG rather than a direct effect. In a similar study, Beck et al. (2005) also employed 2SLS estimation to explore the relationship between the relative size of small and medium enterprise (SME) sector, economic growth, and poverty. They used a new database on the share of SME labour in the total manufacturing labour force in 45 countries over the period 1990-2000. Their study findings did not show any evidence that SMEs alleviate poverty or decrease income inequality, neither confidently support the conclusions that SMEs exert a causal impact on growth, even when controlled for endogeneity. However, there is evidence that the overall business environment facing both large and small firms– as measured by the ease of firm entry and exit, sound property rights, and contract enforcement significantly influences EG.

Bonito et al. (2017) also used fixed-and random-effects on regional data in their study to examine the impact of entrepreneurship and economic growth on poverty, income inequality and economic development in the Philippines. Findings show that entrepreneurship (Micro, Small and Medium Enterprises) had significant impact on economic development (HDI), but no significant evidence of its effect on poverty headcount ratio and income inequality. Korosteleva & Stepien-Baig (2020) as well tried to empirically explore the relationship between poverty alleviation, entrepreneurship (self-employment and business ownership) and gender in transition economies. The 2016 European Bank for Reconstruction and Development (EBRD) Life in Transition Survey (LiTs) data for 51,000 households across 34 countries was used, with the primary focus on 28 transition economies. They employed a multilevel modelling technique to study the determinants of poverty alleviation via looking at individuals, regional, districts, and country factors in the multilevel framework. Their study did not find any significant association between self-employment and PR. However, there was strong support for business ownership leading to reduction in poverty, but the benefits seemed to accrue primarily to individuals at a higher level than bottom quantile of poverty ladder of income distribution. Thus, emphasizing the overall greater importance of higher-potential entrepreneurship as opposed to subsistence entrepreneurship in combating poverty.

In summary, while the literature emphasised the importance of entrepreneurship as a channel through which private sector development contributes to rapid PR and improved standard of living, there remain inconclusive empirical evidence on the effect of entrepreneurship on poverty. Such empirical controversies are attributed to the multidimensional measurement of entrepreneurship. Indeed, there is lack of a measure of entrepreneurship in empirical studies with common characteristics shared by the theoretically identified growth-oriented entrepreneurship and activity-based entrepreneurial behaviour. Such growth-oriented and activity-based entrepreneurship include new business formation and ownership (including registered/formal and informal/non-registered businesses), innovation, improvement-driven opportunity-based entrepreneurship activity, and high job creation expectation rate entrepreneurship. Moreover, while there might be some characteristics that the different growth-oriented entrepreneurship measures may have in common, there is no definitive clarity on which of these measures is superior within and across countries and regions. This study addresses these gaps via examining the poverty-reducing effects of entrepreneurship by employing the use of productive entrepreneurship, which possesses common features shared by the different growth-oriented entrepreneurships.

4.2.3 The Effect of Entrepreneurship on Economic Growth

Several empirical studies that used GEM data for overall TEA and its component indicators have generally found for all other key components apart from necessity-based and non-innovative entrepreneurships, that the effects of entrepreneurship on EG is positive and statistically significant. Accordingly, a study by Van Stel et al. (2005) employed OLS estimation to investigate whether TEA, as a measure of entrepreneurship, influences EG, and whether the influence depends on the level of economic development in 36 countries over the period 1999–2003. They found that the effect of TEA on EG is positive and statistically significant in relatively rich and developed countries, while the effect on EG is negative and statistically significant in less developed (relatively poor and developing) countries. Thus, the effect of entrepreneurship on EG depends on the level of per capita income, suggesting that entrepreneurship plays a different role in countries in different stages of economic development.

Also, Urbano and Aparicio (2016) adopted the Cobb–Douglas production function and employed panel data estimation methods to analyse the effect of different entrepreneurship capital types including overall TEA, Opportunity-based Entrepreneurship Activity (OEA), and Necessity-based Entrepreneurship Activity (NEA) on EG. Using data from 43 countries for the period 2002-2012, they found that these measures have positive and significant effects on EG with differing magnitudes, mainly higher for OEA relative to overall TEA and least to NEA. Their results suggest new elements to both theoretical discussion and public policy focusing on entrepreneurship capital as an important factor to achieve EG.

Building on the theoretical literature that Schumpeterian and Kirznerian entrepreneurships impact EG, Ferreira et al. (2017) explore the effects of these two entrepreneurship types on EG across the different types of economies as classified by the GEM economic ecosystems (factor-driven economy, efficiency-driven economy, and innovation-driven economy). They applied fixed-effect estimation on unbalanced panel data for 43 countries over the period 2009 to 2013. Findings show that labour productivity variable (a measure of economic performance), attains statistical significance in relation to the variables for innovation (Schumpeterian entrepreneurship), opportunity (Kirznerian entrepreneurship), and the overall TEA. The study thus verifies that despite the differences in the Schumpeterian and Kirznerian visions, both illustrate how entrepreneurship generates a positive impact on economic development, growth and the wellbeing of the population. Hence, in line with theories (Kirzner 1973; and Schumpeter 1942), the study provides some preliminary support for the idea that Schumpeterian and Kirznerian entrepreneurship hold statistically significant influence for growth expectations.

In another study, Bosma et al. (2018) individually used, in an institution-entrepreneurship-EG nexus model, different entrepreneurship types including TEA, OEA, high growth expectations entrepreneurship, and the rate of entrepreneurial employees' active involvement in new products and services development (EEA). They used fixed-effect estimation on annual data for 25 European countries for the period 2003-2014. Findings revealed that while there was evidence of a positive association between the different measures of entrepreneurship and EG, the effects of TEA as well as OEA and high growth expectations entrepreneurships on EG were found to be marginally significant while the EEA effect was insignificant. Similarly, Doran et al. (2018) analysed the contributions of different measures/indicators of entrepreneurship including entrepreneurial activity, aspirations, and attitudes to EG, and to examine whether these contributions vary across income levels. They used an unbalanced panel data for 55 countries over the period 2004 to 2011. Findings indicate that entrepreneurial attitudes and aspirations are found to encourage EG in high-income countries while entrepreneurial activity is found to have a negative effect in middle/low-income economies.

A more recent study by Badri and Badri (2020) to investigate the effects of entrepreneurship (TEA) and education on EG in 25 countries using panel-data method for the period 2001-2015 shows that both TEA and education have positive and significant effects on EG. Moreover, Tahir and Burki (2023) in their study explored the potential relationship between entrepreneurship (TEA) and EG in emerging BRICS economies from 2002 to 2021. With the use of pooled OLS, fixed effect, generalized least squares, and two stages least squares estimations, they find that entrepreneurship has a positive and significant influence on EG. Notwithstanding, the causality testing revealed a one-way relationship running from entrepreneurship towards EG.

Other entrepreneurship-EG nexus studies have used new firm formation/ownership density and found positive and significant effect of entrepreneurship on EG. Consequently, Audretsch et al. (2004) builts on the Solow neoclassical and its expanded Romer growth model of production function that incorporated the measures of knowledge capital as a new factor of production, the entrepreneurship capital, and estimate its influence on EG. Their study employs OLS estimation of production function model with different measures of entrepreneurship capital for German regions over the period 1989–92. The results show positive and statistically significant effect. Indicating that entrepreneurship capital is an important factor shaping output and productivity. In an extended and more recent study, Audretsch et al. (2015) employed fixed- and random-effects and GMM estimations to examines the link between entrepreneurship and economic development on a panel data of 127 European cities over the period 1994-2009. They found that the immediate economic development impact of new firm start-ups is positive for both small-/medium-size cities and large cities.

In Africa, Adusei (2016) tested the postulate that entrepreneurships that are not growth-supporting are pervasive in developing economies including Africa. The study used random-effect estimation to investigates whether entrepreneurship is of any relevance to the growth processes of 12 African countries for the period 2004–2011. Findings show that entrepreneurship positively explains the variations in the growth of these countries; hence conclude that entrepreneurship in developing economies including Africa even if replicative is instrumental to EG. Most recently, Zouita (2021) employs fixed- and random-effects and system GMM estimations to examine the effects of entrepreneurship on EG in 95 developing and emerging countries over the period 2006-2018. Decomposing the sample by income level and geographic distribution, the study show that entrepreneurial activity exerts a positive and robust effect on EG in the full sample. The highest impact is reported in Asia, followed by the Middle East and North Africa, Latin America and Caribbean countries, and Sub-Saharan Africa in that order. Furthermore, the study evidence shows that the impact on EG is higher in low-income economies than in high-income economies.

Despite the positive and significant evidence of EG-increasing effect of entrepreneurship presented above, other few studies using new firm formation/ownership density contrastingly found negative and statistically significant effect of entrepreneurship on EG. For instance, Zaki and Rashid (2016) employed OLS estimation to investigate the impact of entrepreneurship (number of new registered businesses) on EG in seven emerging countries over the period 2004-2014. Their findings revealed a negative and significant effect of entrepreneurship on EG and rather emphasised the importance of the role of other factors such as institutional framework and investing in "new economy" sectors, in affecting the relationship. Notwithstanding, another recent study (Kadarusman, 2020) used the self-employment as a measure of entrepreneurship and employed the OLS estimation to investigate the impact of entrepreneurship on economic performance (EG and income per-capita) in Indonesia as indicated for the period 1985-2017. The results confirm a non-significant effect of the growth of entrepreneurial ventures on EG. However, the accumulation of the ventures has a positive and significant effect on the level of income per capita. This finding contributes to a better understanding of the statistically non-significant impact of entrepreneurship on economic growth in developing countries.

4.2.4 Institutional Importance for Entrepreneurship and its Contribution to Economic Development

Reviews of empirical studies as well as other sources on entrepreneurship framework conditions (GEM, 2016; UNCTAD, 2004; and Eurostat-EU, 2012) generally identified factors that influence entrepreneurship development and the inconclusive empirical evidence on its effect on EG and PR. Sush factors include the quality of institutional/governance and macroeconomic policy environments, the level of EG and income distribution, availability of adequate resources (human, finance, and infrastructure), access to technological innovations, and entrepreneurial culture/innovations. Other sources (AfDB, 2011; Brennan and Fickett, 2011; IFC, 2011 & 2013; Foresight Africa, 2020; and UNECA, 2020) also emphasised the prominence of these factors in Africa, in addition to corrupt and inefficient tax systems, and the high legal regulatory burdens.

However, the sources generally recommend effective policies and high-quality and inclusive institutional environments that promote entrepreneurial venture opportunities with the potential for increased jobs/employment creation and to address the challenges faced via effective participation of the poor in entrepreneurial activities and hence EG processes. Indeed, studies across developed and developing countries examined the determinants and the factors that encourage entrepreneurial activities (Amorós, 2009; Klapper et al., 2010; Thai and Turkina, 2013; Sambharya and Musteen, 2014; Autio and Fu, 2015; Angulo-Guerrero et al., 2017; Fuentelsaz et al., 2015; Loukil, 2019; and Urbano et al., 2019). These studies found institutional quality (IQ) in terms of governance, democracy, economic freedom, and doing business as prominent factors that influence entrepreneurship and hence economic development. This is consistent with theoretical evidence (Engerman and Sokoloff, 1997, 2002; Acemoglu et al., 2001 & 2002; & Acemoglu and Robinson, 2012). The theories argue that inclusive and high IQ and effective policy environments strongly encourage increased access to several incentives for entrepreneurship development. These include human capital accumulation, stable financial institutions with efficient macroeconomic policies for savings and investments, low inequality, broad-based economic opportunities through increased investment in entrepreneurship, and increased participation of people including the poor and other marginalised groups in EG decision-making processes.

Moreover, different scholars have revealed the importance of effective governance and institutions such as the rule of law, regulations, and control of corruption for increased and sustained EG productivity (Acemoglu and Robinson, 2012; Roland, 2014; Nissanke, 2015; Mishkin, 2015; Goldin, 2016; Mateer and Coppock, 2018; and Larraín, 2020). According to them, such institutions encourage contracts enforcement for secured property rights, business start-ups, efficient tax and financial systems, freedom to trade across-borders, competitive and open markets, increased accountability, and commitment to infrastructure and human capital development. In addition to largely accounting for technological progress and total factor productivity, the sources also argue that these institutions provide incentives for increased private sector investments and development and the emergence of new technologies and innovations, which are necessary for entrepreneurship and sustained and inclusive economic development. Additionally, empirical studies have emphasised the importance of IQ through its direct effects on EG (Acemoglu et al., 2005; Glaeser et al., 2004; Rodrik et al., 2004; and Siyakiya, 2017) and on PR (Tebaldi and Mohan, 2010; and Perera and Lee, 2013). However, theoretical hypothesis by Bluhm and Szirmai (2012) and Szirmai (2005; & 2008) argue that IQ facilitates, through moderation/mediation, the contribution of factors of production (including entrepreneurship) to socio-economic outcomes.

Recent studies on the causal links between entrepreneurship and EG (Acs et al., 2018; Gu et al., 2021; Zouita, 2021; and Khyareh, 2023) emphasised the importance of institutional quality for the improved performance of entrepreneurship in an economy. They argue that high quality competitive pro-market institutional environment strongly encourages entrepreneurship and its effective contribution to increased EG. Accordingly, Acs et al. (2018) conceptually and empirically analysed the relationship between economic growth, factor inputs, institutions, and entrepreneurship. They investigated using global survey and institutional data for 46 countries for the period 2002–2011, whether entrepreneurship in combination with institutions and human agency in an entrepreneurial ecosystem can be viewed as important in the growth process. Employing fixed effect estimation, they find that while the effects of institutional and entrepreneurial components on EG were each mildly significant at the 10% level, the effect of the entrepreneurial ecosystem on EG was positive and statistically significant at the 5% level. The study thus shows that the influence of institution on the contribution of entrepreneurship to EG is positive and significantly strong.

Similarly, Khyareh (2023) used GMM in response to the questions: why some countries have higher economic growth and more entrepreneurial activity than others, and what factors determine the relationship between entrepreneurship and growth. During which, the study attempts to identifying the moderating effect of governance institutional quality based on a sample of 54 countries over the period 2008 to 2020. Results show that the quality of governance institutions increases the positive relationship between entrepreneurial activity and EG. Zouita (2021) controls for the role of institutions when assessing the effects of entrepreneurship on EG in 95 developing and emerging countries for the period 2006-2018. By employing robust estimations including fixed- and random-effects and system GMM, the study finds that institutional quality (regulatory quality, the rule of law, and control of corruption) enhances the positive effects of entrepreneurship on EG.

Regarding PR, others (Acemoglu and Robinson, 2012; Tomizawa et al., 2019; and Si et al., 2020) have revealed evidence showing that well reformed and inclusive institutions provide a more likely encouraged and nurtured environment for innovation and entrepreneurship.

The sources argue that such institutions are characterized by appropriate rule of law and enforcement of property rights, increased constraints on the actions of politicians and other elites, and efficient regulations in accountable and less corrupt governance system. According to them, these institutions allow the broad segments of society including the poor and marginalized to have access to finance and market to enhance their financial and human capital through investment, and increased participation in the growth process and its associated benefits. Furthermore, the institutions increase the integration of the poor into more inclusive markets, which through institutional restructuring is assumed to be the primary drivers of poverty alleviation. Notwithstanding, the institutions prevent well-connected elites from not expropriating others' innovation and incomes.

Other evidence also supports the notion that IQ influences the increased contribution of entrepreneurship to PR. For instance, in a conceptual study, Goel and Karri (2020) explored the role of institutions in connections between entrepreneurial aspirations and PR. Integrating institutional theory and a subjective view of entrepreneurial action across different institutional environments, they found that institutions affect the subjective value of resources and thus moderate the actionable effect of entrepreneurial aspirations. These enhance the poor to observe and adopt unique ways to exploit entrepreneurial opportunities with changes in their aspirations for increased PR.

Also, Aziz et al. (2020) in investigating the contributions of entrepreneurial activity and entrepreneurship facilitators to PR (improved HDI) found that governance factor index as facilitator influenced the direct positive and significant effect of entrepreneurship on HDI. They also found as expected the cost of starting and doing business factor index to influence the direct negative and significant effect of entrepreneurship on HDI. Thus, arguing that high cost of starting a business demotivates the creation and registering of new business start-ups and hence reduces its impact on HDI. In addition, Gu et al. (2021) explores the effect of innovation and business entrepreneurships and the moderation effects of business environmental index on social development dimensions of sustainable development (MHDI). They found that both innovation and business entrepreneurships each in isolation have no significant effects on MHDI (or PR). Rather, the influence of business environment index, in interaction, on the contribution of business entrepreneurship to MHDI is found to be positive and significant. Thus, concluding that a good business environment improves the rates of employment, and hence increases social welfare.

Furthermore, considering the level of income inequality as a major constraint to the poverty-reducing effect of entrepreneurship, Asamoah et al. (2021) analysed the effect of innovation and entrepreneurial activity on income inequality in high-income and middle low-income countries. During which, they also examined whether institutional quality acts as a mediator in influencing the innovation–income inequality or entrepreneurship–income inequality nexus. Using spatial econometric techniques on longitudinal data for the period 2000–2016, a mixed relationship between entrepreneurial activity and inequality was observed. They found positive relationship with entrepreneurial activity proxied by self-employment but negative relationship with measures of new business entry rate. Also, the empirical results indicated that innovation is significant in widening income inequality, especially for high income countries. However, the findings demonstrate that institutional quality acts as a mediator to reduce income inequality in high-income countries when interacted with innovation, but the opposite is found in the middle- and low-income countries, mainly due to imitation in developing countries. The interaction between institutional quality and entrepreneurial activity (self-employment and new business entry rate) is found to reduce income inequality in middle- and low-income countries.

In summary, empirical and theoretical literature have consistently emphasised high-quality and inclusive institutional environment as key determinants for promoting entrepreneurship development and its contribution to EG and PR. Indeed, some studies have attempted assessing the moderating influence of IQ on the contribution of entrepreneurship to PR. These studies generally used non-income poverty measures such as HDI and MHDI with different measures of entrepreneurship, some not even growth-oriented types. Also, where there are differences in the effects of entrepreneurship on income and non-income poverty measures there is a lack of robust empirical studies on the moderating effect of IQ on income poverty-reducing effect of entrepreneurship. Moreover, while the concepts of entrepreneurship remain multidimensional, no study has employed any measure with common characteristics exhibited by the different entrepreneurial measures to examine the moderating effects of IQ on the income poverty-reducing effect of entrepreneurship. This study addresses these gaps using PE and IQ dimensions of WGI.

4.2.5 Research Questions and Contributions to Literature

Several empirical studies reviewed on the causal effects of entrepreneurship on EG as well as poverty commonly used different types/measures of entrepreneurship and the respective data sources. One of the types of entrepreneurships used in literature is the new registered firm/business formation density (NBD) with data from the World Bank Entrepreneurship

Survey (WBES) database (Audretsch et al., 2015; Djankov et al, 2019; Aziz et al., 2020; Adenutsi, 2023; and Ajide and Dada, 2023). Self-employment data (including other forms of employment share) from the World Bank World Development Indicators (WDI) as well as national/international labour institutions databases is another (Beck et al., 2005; Tamvada, 2010; Kadarusman, 2020, and Van Le et al., 2022). Also, and more important is the Total early-stage Entrepreneurial Activity (TEA) with data from the Global Entrepreneurship Monitor (GEM) database (Bampoky et al., 2013; Aparicio et al., 2016; Ferreira et al., 2017; Bosma et al., 2018; Kim et al., 2022). The TEA constitutes various forms, such as registered (formal) and unregistered (informal) new firms/businesses, innovation entrepreneurship (including the use of technology), improvement-driven opportunity entrepreneurial activity (IOEA), necessity-based entrepreneurial activities (NEA), high job/employment creation expectation rate (HJCER) entrepreneurship, and non-innovative entrepreneurship.

Despite the importance of entrepreneurship for increased and sustained EG and PR, inconclusive empirical evidence remains in literature on EG-increasing effect of entrepreneurship. Indeed, a set of empirical studies (Van Stel et al., 2005; Audretsch et al., 2015; Adusei, 2016; Urbano and Aparicio, 2016; Ferreira et al., 2017; Bosma et al., 2018; Doran et al., 2018; and Zouita, 2021) used one or two of these measures: overall TEA, IOEA, HJCER, and innovation individually and strongly show positive and significant effects of entrepreneurship on EG. On the contrary, Zaki and Rashid (2016) and Kadarusman (2020) using NBD and self-employment respectively argue that the effect of entrepreneurship on EG is negative and statistically significant. There is also similar and wider inconclusive evidence in literature on the poverty-reducing effect of entrepreneurship. Accordingly, recent empirical studies (Aziz et al., 2020; Afawubo and Noglo, 2021; Amorós et al., 2021; Ajide and Dada, 2023, and Azamat et al., 2023) using overall TEA and NBD show significant effect of entrepreneurship on PR. However, others (Beck et al., 2005; Bonito et al., 2017; Djankov et al, 2019; and Adenutsi, 2023) using self-employment and NBD entrepreneurships revealed evidence of insignificant effect of entrepreneurship on PR.

From reviews, these controversies are due to the differences in types of entrepreneurship and sources of data used. While overall TEA and some of its components (IOEA, HJCER, and innovation) have consistently shown significantly positive and negative effects on EG and poverty respectively as expected, these controversies are mostly observed from the use of NBD, self-employment, and other components of TEA such as non-innovation entrepreneurships and NEA. This is further confirmed by studies that examined the effect of entrepreneurship on both EG and PR (or improved human development). For instance, Dhahri and Omri (2018) used overall TEA (formal and informal business) and found its increased significant positive effects on both EG (GDP per capita) and MHDI. In contrast, Gu et al. (2021) and Gebremariam et al. (2004) respectively used NBD and self-employment (relative size of small businesses) and found in both cases the significant positive effects on EG, but insignificant effects on MHDI and income PR in that order. In fact, another study (Benghalem and Fettane, 2021) that used NBD did not find any significant effects on both EG and PR (social development)

The review also reveals that the inconclusive empirical evidence on the causal effect of entrepreneurship on EG and PR depends on the level of economies and income distribution, level of human capital and availability of infrastructure facilities, access to finance, and regional/country variations. It also depends on the quality of governance, institutions, and macroeconomic policy environments that influence new business or entrepreneurship development. Indeed, the entrepreneurship framework conditions by the GEM (2016) and in UNCTAD (2004) and Eurostat - EU (2012), identified limited human capital, financial, and infrastructure resources, as factors that largely affect business start-ups thereby reducing its effect on EG and PR. Furthermore, high income inequality contributes to the evolution of poverty and hence reduces the poverty elasticity of entrepreneurship.

There also remains inconclusive evidence over the income level of economies as a determining factor for entrepreneurship effect on development outcomes at different stages of a country's economic development. For instance, some studies argue that the effect of entrepreneurship on EG, PR or welfare is significant in developed countries but insignificant in developing low- and middle-income countries (Van Stel et al., 2005; and Doran et al., 2018). In contrast, Adusei (2016) and Ajide and Dada (2023) argue that entrepreneurship has significantly positive and negative effects respectively on EG and poverty in developing African countries. Also, others (Tamvada, 2010; Jax, 2020; and Van Lee et al., 2022) show significant effects of entrepreneurship on PR in India and Vietnam, while in West Virginia in the United States Gebremariam et al. (2004) revealed insignificant effect of entrepreneurship on PR. Besides, robust comparative geographical regional analysis of the effect of entrepreneurship on poverty (or human development) is largely missing in literature.

In addition to the diverse measures/types of entrepreneurships, sources argue that entrepreneurship essentially deals with the behavioural characteristics and activities of individuals (Wennekers and Thurik, 1999; Audretsch et al., 2006; UNCTAD, 2004; Carree and Thurik, 2003 & 2010; and Avanzini, 2011). Entrepreneurship is thus a multidimensional concept that lack a unified definition representing the appropriate measure linking its effect from individual behavioural level to aggregate level of development outcomes. Despite the multidimensionality, theoretical and empirical sources have literally identified growth-oriented entrepreneurships (Wennekers and Thurik, 1999; Audretsch et al., 2004; Acs & Varga, 2005; and Baumol and Schilling, 2008). These include those involved in TEA in terms of new business/firm set-up and ownership (formal and informal), IOEA, innovative/creative entrepreneurship through which IOEA are often spotted and utilised, and HJCER. TEA also constitute NEA, non-innovation entrepreneurship, and non-IOEA, which are less growth-oriented entrepreneurships. Evidence from recent empirical studies also support this (Audretsch et al., 2015; Adusei, 2016; Aparicio et al., 2016; Ferreira et al., 2017; Bosman et al., 2018; Kim et al., 2022).

According to Wennekers and Thurik (1999) and Van Le et al. (2022), measuring entrepreneurship in terms of self-employment (including employment share) as used in some studies (Gebremariam et al., 2004; Beck et al., 2005; Tamvada, 2010; Goetz et al., 2012; Slivinski, 2012; Bonito et al., 2017; Jax, 2020; Kadarusman, 2020; Korosteleva & Stepien-Baig, 2020; and Van Le et al., 2022) does not fully suffice and is only preferred when data is lacking. Its use is criticized and limited as an incomplete measure since it does not capture the aspects of other entrepreneurial measures and is likely to account for individuals forced into self-employment that is not driven by income/wealth-based improvement opportunity but by the lack of job availability. This is similar to NEA, where individuals are involved in entrepreneurship due to the lack of other options for work, and hence discourages EG in developing countries (Boudreaux and Caudill, 2019).

Some studies (Dhahri and Omri, 2018; Afawubo and Noglo, 2021; Amorós et al., 2021; and Rani and Kumar, 2021) have employed TEA using the Global Entrepreneurship Monitor (GEM) data, which in terms of measurement, focuses predominantly on new business formation/start-up (formal and informal) and owner-manager rates, where the ownership and management can be translated into a risk bearing activity and coordination of production and its factors through judgmental decisions (Knight, 1921; and Hébert and Link, 1989). The new business formation/start-up and owner-manager aspects of TEA account for both formal (registered) and informal (unregistered) as well as the various forms of business ownership. Others (Tamvada, 2010; Goetz, 2012; Zaki and Rashid, 2016; Kadarusman, 2020; and Naudé, 2011) have indeed echoed that small business start-ups and ownership dominate increased employment or job creation as evidence of the beneficial effect of entrepreneurship in both developed and developing countries. However, it does not mainly focus on the aspects of other entrepreneurial measures such as innovation, IOEA, and HJCER, rather it constitutes other less growth-oriented entrepreneurial aspects including NEA, non-innovation, and those based on non-IOEA.

Notwithstanding, studies that exclusively employed the rate of new firm formation, especially for entrepreneurship-poverty linkages, only a few (Dhahri and Omri, 2018; Benghalem and Fettane, 2021; and Daly and Garroud, 2022) used GEM data with indices of human development, environmental quality, and gross domestic product as dependent variables. All others used World Bank Group Entrepreneurship Survey data, which considers only formal (registered) and only one form of business ownership - the limited liability corporations. They built on the evidence that entrepreneurship is through initiating economic activities (starting a business) via the legal process (Klapper et al., 2010). Although Zaki & Rashid (2016) found negative and significant effect of entrepreneurship on EG, they argued that the number of newly registered businesses may underestimate or not accurately reflect the level of entrepreneurship in economies. This is because it excludes the informal sector, which is estimated to play a significant role in the study economies, especially developing countries.

In line with Kirzner (1973) and as adopted in the GEM survey, IOEA (driven by opportunity based on independence and increased income, and wealth) as opposed to NEA (driven by situations of just maintaining income or due to unemployment with no other work options) are derived from TEA as its two motivation-based components. While IOEA aspect of TEA is growth-oriented, especially in developed and emerging economies, it does not entirely focus on the aspects of innovation. Emphasised by Schumpeter (1934 & 1942) and Wennekers and Thurik (1999), innovation is the defining feature of entrepreneurship and main driver of EG and development through technological, societal, and human progress, which takes into consideration entrepreneurs engaged in Research and Development (R&D) for its measurement.

Although IOEA already accounts for the rate of new business formation aspect (with formal and informal and all forms of businesses) captured in TEA, it also does not mainly focus on the aspect of HJCER. While a number of IOEA - EG model studies have used the actual activity related measure of IOEA, there are only a few studies (Brennan & Fickett, 2011; and Venâncio and Pinto, 2020) on IOEA - poverty related models. The models employed financial and social returns indices, and Sustainable Development Goals related indices as dependent variables, which are less precise measures of income poverty. Moreover, HJCER (Bosman et al., 2018 – for EG; and Lecuna, 2020 – for income inequality) and innovation

(Ferreira et al., 2017; Ballesta & Rosales, 2020; Gu et al., 2021; and Shirima, 2021) are indeed limited in literature. Besides, the measures of innovation are mostly proxied by the number of patent applications, which is similar to NBD in orientation by not accounting for informal businesses.

Despite the importance of growth-oriented measures/types of entrepreneurships, empirical studies reviewed in this study generally showed that they are largely used individually or in isolation or in a combined form that does not satisfy the theoretical definition adopted for entrepreneurship in this study. Indeed, Carree and Thurik (2003) and Van Le et al. (2022) argue that using only one or interaction of two of the measures of growth oriented-entrepreneurships cannot reflect the actual EG-increasing or poverty-reducing effect of entrepreneurship, since such combination does not capture the remaining aspects or measures/types. It is therefore required, in line with the above definition of entrepreneurship, to employ an indicator that captures the actual behaviourial activity-based entrepreneurship features that the theoretically growth-oriented entrepreneurial measures share in common. Such indicator, which has not been used before in entrepreneurial empirical studies, is referred to in this study, as productive entrepreneurship (PE).

This study is therefore the first to use a measure of entrepreneurship using data from existing GEM database for a weighted average variable that captures common characteristics shared by theoretically identified growth-oriented entrepreneurships in literature and derived from Principal Component Analysis. Productive Entrepreneurship, as measured in this study, is a variable or indicator derived using PCA from the weighted average of the measures of growth-oriented entrepreneurships, namely, Improvement-driven Opportunity-based Entrepreneurial Activity (IOEA), innovation entrepreneurship activity, and High Job Creation Expectation Rate (HJCER) entrepreneurship activity. These types/forms entrepreneurship are well defined and explained in terms of measurements in **section 4.3.3** of this thesis report. While it captures the actual behaviourial activity-based entrepreneurship features that the theoretically growth-oriented entrepreneurial measures share in common, it also accounts for all forms of firms/businesses and both registered (formal) and unregistered (informal) ones. While productive entrepreneurship as defined in this study, is the first to be used in entrepreneurship-poverty empirical study literature, this study attempts to address the research question below:

Does productive entrepreneurship have any significant effect on income PR at the global level and in Africa relative to other regions?

Furthermore, studies reviewed also revealed that the effect of entrepreneurial capital on EG and PR is limited in environment with high macroeconomic and political instability, and low quality of governance and institutions that matter for sustained EG. These studies call for effective socioeconomic policies and high-quality institutions and governance to address these challenges. Accordingly, empirical evidence identified high-quality inclusive institutions and governance as important determinants for entrepreneurship development (Amorós, 2009; Klapper et al., 2010; Thai & Turkina, 2013; Sambharya & Musteen, 2014; and Urbano et al., 2019). This is consistent with the theories that emphasised the importance of institutions for sustained increase in EG (Engerman and Sokoloff, 1997, 2002; Acemoglu et al., 2001 & 2002; Acemoglu and Robinson, 2012).

Also, there is growing evidence on the significant effects of institutions on PR (Tebaldi and Mohan, 2010; Doumbia, 2019; and Fagbemi et al., 2020). While IQ is important for PR, other recent empirical studies have revealed evidence of significant influence of IQ on the poverty-reducing effects (Goel and Karri, 2019; Aziz et al., 2020; Si et al., 2020; and Gu et al., 2021), EG-increasing effects (Acs et al., 2018; Zouita, 2021; and Khyareh, 2023), and increasing income-distribution effects (Asamoah et al., 2021) of entrepreneurship. From the perspectives of socioeconomic and private sector development policy and practice, high-IQ and good governance are critical for the achievement of the objectives of inclusive growth framework (ADB, 2011; AfDB, 2012; Cerra, 2022; and Ivanyna and Salerno, 2022). These align with the theoretical hypothesis of Bluhm and Szirmai (2012) and Szirmai (2005; & 2008) emphasising that IQ facilitates the contribution of all forms of factors of production (including entrepreneurship) to socioeconomic outcomes such as PR and human development.

Some empirical studies (Djankov et al., 2019; Aziz et al., 2020; Afawubo and Noglo, 2021; Asamoah et al., 2021; Gu et al., 2021; and Van Le et al., 2022) utilised IQ in the econometric models/frameworks. However, very few (Aziz et al., 2020; and Asamoah et al., 2021; Gu et al., 2021) employed the terms of interaction between IQ and the measures of entrepreneurship to the moderating influence of IQ on income poverty-reducing effects of entrepreneurship. Also, Aziz et al. (2020) and Gu et al. (2021) used New Business Density (NBD) entrepreneurship data from the World Bank Entrepreneurship Survey Database, which accounts for only formal/limited liability companies, but not informal/unregistered, neither the forms of businesses, nor the characteristics of other types of growth-oriented entrepreneurships. Besides, both studies only examined the effect of entrepreneurship on non-monetary poverty measures. Asamoah et al. (2021) also attempted using the moderating effect of IQ but on income inequality as the dependent variable and then separately employed self-employment, NBD, and innovation (proxied by number of registered patents similar to NBD).

While there are differences in the effects of entrepreneurship on income and non-income poverty measures (Gebremariam et al., 2004; Dhahri and Omri, 2018; Benghalem and Fettane, 2021; and Gu et al., 2021), there is no robust empirical study on the moderating effect of IQ on income poverty-reducing effect of entrepreneurship. Additionally, despite the evidence on the importance of high and inclusive IQ and good governance for EG and PR, the existing situation in Africa is different. Evidence from different sources show the dominance of business environment/climate by macroeconomic and political instability, inefficient tax systems, high level of corruption, and high legal and regulatory burdens (AfDB, 2011; Brennan & Fickett, 2011; IFC, 2011 & 2013; Foresight Africa, 2020; and UNECA, 2020).

Thus, based on the above IQ related gaps, this study also attempts to explore the empirical question below:

Does IQ significantly influence the poverty-reducing effect of productive entrepreneurship at the global level and in Africa relative to other regions?

From the above research questions, the study therefore investigates, in this chapter, the following specific objectives:

i. Examine the effect of productive entrepreneurship on PR at the global level and in Africa relative to other regions.
ii. Analyse the extent to which IQ influences the poverty-reducing effect of productive entrepreneurship at global level and in Africa relative to other regions.

4.3 Methodology

4.3.1 Empirical Specification Framework

The study is built on the neoclassical (Solow, 1956 & 1957) and the endogenous (Romer, 1986 & 1990) growth theories, as well as the theory of entrepreneurial knowledge spillover (Knight, 1921; Schumpeter, 1934; Kirzner, 1973; Baumol, 1990/93; Audretsch, 1995; and Braunerhjelm et al., 2010) in the growth process. While the general growth model of Solow and Romer build on the dependence of output on endogenous capital accumulation and labour force, the Romer and entrepreneurial knowledge spillover theories refer to knowledge factor as an endogenous factor of production, known as entrepreneurship capital. The Romer and entrepreneurial knowledge spillover theories claim that long-run growth process is better explained when the role of entrepreneurship talent is considered. Indeed, Okey (2015) and Ruhashyankiko and Yehoue (2006) identified entrepreneurship as a major component of private sector development (PSD) that contribute to sustained EG. Other theoretical ideas (Wennekers and Thurik, 1999; Audretsch and Thurik, 2000; AfDB, 2011; IFC, 2013; and EU, 2012) also argue that entrepreneurship and the private sector contribute to sustained EG, rapid PR, and improved standards of living through increased capital investment, productive employment/job creation, and increased tax revenue, incomes and wages. In line with other theoretical concepts from various sources (UNDP, 2005; Hassan et al., 2006; Hood, 2007; and Babajić and Nuhanović, 2021), the achievement of development outcomes such as sustained and inclusive EG and PR at all levels depend on competitive PSD.

Building on the above, the theoretical and empirical model of this study starts with the basic analytical poverty-growth relationship by others (Ravallion and Datt, 1996; Ravallion & Chen, 2007; Ferreira et al, 2010; and Christiaensen et al., 2011), that the level of poverty measured in logarithms is in direct proportionate relationship with the level of per capita GDP as follows:

$$\mathrm{InP}_{it} = \alpha_i + \beta \mathrm{In} y_{it}^{N} + \varepsilon_{it} \qquad (1)$$

Where P_{it} is the vector of measures of the level of poverty headcounts ($1.90 and $3.20/day), $\mathrm{In}y_{it}^{N}$ is the level of GDP per capita in country i at time t, ε_{it} is the error term (white noise-error process that includes errors in poverty measure), and the estimation parameter β is the poverty elasticity.

GDP per capita, y_{it}^{N}, is given in terms of the level of output, Y_{it}, and total population (N_{it}) as follows:

$$y_{it}^{N} = \frac{\mathrm{Y}_{it}}{\mathrm{N}_{it}} \qquad (2)$$

Analogous to the approach of disaggregating GDP per capita by others (Benfica & Henderson, 2021; and Gutierrez et al., 2007), the relationship between the level of poverty and the levels of labour productivity and labour force participation or employment expansion in country i, at time t is as follows:

$$y_{it}^{N} = \frac{\mathrm{Y}_{it}}{\mathrm{N}_{it}} = \frac{\mathrm{Y}_{it}}{\mathrm{L}_{it}} * \frac{\mathrm{L}_{it}}{\mathrm{N}_{it}} = \frac{\mathrm{Y}_{it}}{\mathrm{L}_{it}} * \theta_{\mathrm{it}} \qquad (3)$$

Where y_{it}^{N} is disaggregated into labour productivity, $(\frac{\mathrm{Y}_{it}}{\mathrm{L}_{it}})$, denoted by y_{it}, and labour force participation or employment expansion $(\theta_{\mathrm{it}} = \frac{\mathrm{L}_{it}}{\mathrm{N}_{it}})$, with labour/persons employed, L_{it}, and total population, N_{it}.

Substituting from above, equation (1) becomes as follows:

$$\mathrm{InP_{it}} = \alpha_{\mathrm{i}} + \beta \mathrm{In} y_{it} + \gamma \mathrm{In}\theta_{\mathrm{it}} + \varepsilon_{\mathrm{it}} \qquad (4)$$

A required relationship for the level of labour productivity $(y_{it} = \frac{\mathrm{Y}_{it}}{\mathrm{L}_{it}})$ is built on the neo-classical Solow (1956) growth theory, as well as Cobb-Douglas production function.

Drawn from various sources (Jhingan, 2011; Perkins et al, 2013; Weil, 2013; and Roland, 2014) the level of an economy's output/income, Y_{it}, in the Solow (1956) model and as expressed by the Cobb-Douglas production function is as follows:

$$\mathrm{Y}_{it} = F(K_{it}, L_{it}) = AK_{it}^{\alpha} L_{it}^{(1-\propto)} \qquad (5)$$

Where K_{it} is capital, L_{it} is the labour, A is a parameter thought of as measuring productivity, commonly known as labour-augmenting technology, such that a country with bigger A will produce more output.

In terms of output per worker with the production function having constant returns to scale, it means that the quantity of output per worker would only depend on the quantity of capital per worker, making equation (5) become as follows:

$$\frac{Y_{it}}{L_{it}} = F\left(\frac{K_{it}}{L_{it}}, \frac{L_{it}}{L_{it}}\right) = A\left(\frac{K_{it}}{L_{it}}\right)^{\propto}\left(\frac{L_{it}}{L_{it}}\right)^{1-\propto}$$

Denoting output per worker/labour to by $\dot{y_{it}} = \frac{Y_{it}}{L_{it}}$ and capital per worker by $\dot{k_{it}} = \frac{K_{it}}{L_{it}}$; it implies that output per worker/labour then becomes as follows:

$$\dot{y_{it}} = A\dot{k_{it}}^{\propto} \qquad (6)$$

Generally, consumption, $\mathrm{C_t}$, and savings, $\mathrm{S_{it}}$, are the components of national income/output, Y_{it}. So, in line with the Solow-Swan model, considering savings coming from income not consumed means that national savings is a constant fraction, σ_{it}, which is saving measured as a fraction of national output/income, which is usually the source of investment:

Since income equals output, it implies that,

$$S_{it} = \sigma_{it} Y_{it}$$

Thus, saving per worker/labour denoted by δ, is given by,

$$\delta = \frac{S_{it}}{L_{it}} = \sigma_{it} \frac{Y_{it}}{L_{it}} = \sigma_{it} \dot{y}_{it}$$

Also, in a closed economy, expenditure to meet aggregate demand is spread across consumption and investment, I_{it}, which is known to create additional capital. This means that in an equilibrium state of aggregate supply and demand, savings, S_{it} equals investment, I_{it}. Correspondingly, the fraction, σ_{it}, then becomes investment as a fraction of national output/income. Thus, investment per worker is given by

$$\frac{I_{it}}{L_{it}} = \sigma_{it} \dot{y}_{it} \qquad (7a)$$

With capital per worker as a fundamental factor in the growth process, Mankiw et al. (1992) in line with others (Jhingan, 2011; Perkins et al., 2013; Weil, 2013; and Roland, 2014), argue that the net change in capital stock per worker, $\Delta\dot{k}_{it}$, overtime is the excess of saving per worker over the required investment per worker ($\gamma = \frac{I_{it}}{L_{it}}$) to maintain capital per worker. Thus,

$$\Delta\dot{k}_{it} = \delta - \gamma \qquad (7b)$$

However, Mankiw et al. (1992), Jhingan (2011), and Perkins et al. (2013) posit that the investment required to maintain capital per worker, depends on the population growth rate 'n', the depreciation rate 'd', and the growth rate of labour-augmenting technology 'g'. As they put forward, since the population is assumed to grow at a constant rate 'n', the capital stock in per worker term then grows at the rate $n*\dot{k}_{it}$ to invest/provide capital to the growing population. Also, since depreciation is a constant 'd', the percentage of the capital stock given by $d*\dot{k}_{it}$ is the investment needed to replace worn-out capital. Similarly, the growth rate of exogenous labour-augmenting technology 'g', is assumed to grow at the rate $g*\dot{k}_{it}$ to provide capital to the growing demand of technological and knowledge advancement.

The sum of investment per worker in providing capital to the growing population, $n*\dot{k}_{it}$, the depreciation investment per worker $d*\dot{k}_{it}$, and the investment per worker to meet the growing technological demand $g*\dot{k}_{it}$, account for investment per worker to maintain capital per worker or capital-labour ratio . That is,

$$\gamma = n*\dot{k}_{it} + d*\dot{k}_{it} + g*\dot{k}_{it} = (n + g + d)\dot{k}_{it} \qquad (7c)$$

Hence, the net change in capital stock per worker, $\Delta\dot{k}_{it}$ after substituting equations (6), (7a) and (7c) in (7b) is therefore given by:

$$\Delta\dot{k}_{it} = \sigma_{it}\dot{y}_{it} - (n + g + d)\dot{k}_{it} = \sigma_{it} A\dot{k}_{it}^{\propto} - (n + g + d)\dot{k}_{it} \qquad (8)$$

Equation (8) represents the fundamental Solow-Swan model, where the steady state of the economy is established corresponding to a value where $\dot{k_{it}} = \dot{k}_s$ at which $\Delta\dot{k}_{it} = 0$, so that:

$$\sigma_{it} A \dot{k}_s^{\propto} = (n + \mathrm{g} + d)\dot{k}_s \quad (9)$$

First dividing both sides by $\dot{k}_s^{\propto}$ and by $(n + \mathrm{g} + d)$ and then raising both sides of the resulting equation to the power $\frac{1}{(1-\propto)}$, gives

$$\dot{k}_s = \{A\sigma_{it}/(n + \mathrm{g} + d)\}^{1/(1-\alpha)} \quad (10a)$$

Substituting $\dot{k}_s$ into the production function in equation (6), putting $\dot{k_{it}} = \dot{k}_s$ gives,

$$\dot{y}_{it} = \{\sigma_{it}/(n + \mathrm{g} + d)\}^{\alpha/(1-\alpha)}(\mathrm{A})^{1/(1-\alpha)} \quad (10b)$$

Now taking natural logarithms across gives,

$$\ln\dot{y}_{it} = \frac{1}{(1-\propto)}\ln\mathrm{A}_{it} + \frac{\propto}{(1-\propto)}\ln\sigma_{it} - \frac{\propto}{(1-\propto)}\ln(n + \mathrm{g} + d) \quad (12)$$

Following Mankiw et al. (1992), depreciation 'd', is considered constant across countries as it is not expected to vary greatly across countries, and the lack of accurate country level data cannot allow the estimation of country-specific depreciation rates. Also, as adopted here, they assumed that while the population is assumed to grow at a constant rate 'n', the exogenous growth rate 'g' to be constant and reflects advancement of knowledge that is not country specific. Hence the term $\ln(n + g + d)$ in equation (12) is captured as a constant term in the current study econometric model, as the natural logarithm of a constant gives a numerical value that remains constant.

The term A_{it}, which is mainly total factor productivity, is a function of technological progress, resource endowment, institutions, knowledge capital in the form of entrepreneurship 'PE', etc. This study considers the contribution of entrepreneurship as a major component of private sector development to achievement of sustained economic growth and PR. Drawn from the endogenous growth theory and the knowledge spillover theory of entrepreneurship (Audretsch et al., 2004 & 2007; Braunerhjelm et al., 2010), knowledge in the form of entrepreneurship is accounted for as a key endogenous factor in the production function. Its presence facilitates knowledge diffusion that eventually contributes to increased and sustained EG.

Thus, capturing the term as $\frac{1}{(1-\propto)}\ln\mathrm{A}_{it}$ as productive entrepreneurship, PE, and constant term C in place of $\frac{\propto}{(1-\propto)}\ln(n + \mathrm{g} + d)$, equation (12) becomes as follows:

$$\ln y_{it} = PE_{it} + \frac{\propto}{(1-\propto)}\ln\sigma_{it} + \mathrm{C(constant)} \quad (13)$$

Substituting equation (13) into equation (4), the poverty-entrepreneurship model below is obtained:

$$\text{InP}_{it} = \beta_0 + \beta_1 \ln\sigma_{it} + \beta_2 PE_{it} + \beta_3 \text{In}\theta_{it} + \varepsilon_{it} \quad (14)$$

Where β_0 = C(constant), $\beta_1 = \frac{\propto}{(1-\propto)}$, and σ_{it} is capital investment as a fraction of national output/income.

For control variables, others have argued that the poverty-reducing effect of the level of economy depends on the level of income inequality (InGini_{it}) and initial conditions including human capital (Ravallion, 1995; Adams, 2004; Sembene, 2015; Adeleye et al., 2020; Amorós et al., 2021; and Van Le et al., 2022). Thus, capturing Gini income inequality (InGini_{it}) in the model, it gives:

$$\text{InP}_{it} = \beta_0 + \beta_1 \ln\sigma_{it} + \beta_2 PE_{it} + \beta_3 \text{In}\theta_{it} + \beta_4 \text{InGini}_{it} + \beta_{(4+r)} \mathbf{X}_{it} + \varepsilon_{it} \quad (15)$$

Where $\mathbf{X}_{it}$ represents a vector of other control variables including the initial conditions.

Also, in line with theoretical evidence (Engerman and Sokoloff, 1997 & 2002; and Acemoglu et al., 2001 & 2002; Bluhm and Szirmai, 2012; and Szirmai, 2005, 2008, 2012a), institutional quality (IQ) is an endogenous factor in the production function and a fundamental determinants of growth and its components. While endogenous, the sources claimed/hypothesized that political, social, and economic institutions and policies play important role in facilitating the transformation of other factors of production including entrepreneurship into socio-economic development outcomes. Moreover, other related studies (Djankov et al., 2019; Aziz et al., 2020; Lecuna, 2020; Asamoah et al., 2021; Van Le et al., 2022; and Azamat et al., 2023) that used IQ are also followed in the current model development. Thus, accounting for IQ and its interaction term to test the above theoretical hypothesis on the extent to which IQ influences the contribution of the level of productive entrepreneurship, through interaction to the level of poverty, the model equation (15) becomes as follows:

$$\text{InP}_{it} = \beta_0 + \beta_1 \ln\sigma + \beta_2 PE_{it} + \beta_3 \text{IQ}_t + \beta_4 \text{In}\theta_{it} + \beta_5 \text{InGini}_{it} + \beta_6 (\text{IQ}_{t} * PE_{it}) + \beta_{(6+r)} \mathbf{X}_{it} + \varepsilon_{it} \quad (16)$$

Where IQ_t represents the level of IQ. Equation (16) represents the level of poverty ($\ln P_{it}$) as a linear translation function of IQ_t, the level of entrepreneurship measured in percentage of labour engaged in productive entrepreneurship, the interaction term between entrepreneurship and IQ_t, $\ln\sigma_{it}$ is capital investment per work/labour force, and $\text{In}\theta_{it}$ is the labour force participation or employment expansion in country 'i' at time 't'. Where r = 0, 1, 2, …

4.3.2 Data Issues and Instrumentation

Huge challenges regarding data coverage, availability, and quality for measures of economic development outcomes such as poverty, human development, institutions, and economic growth (and its compositions including entrepreneurship), remained major concerns in academic and applied social science research (Ravallion et al., 1991; Ravallion, 1995; Chen and Ravallion, 2010; Young 2012; Jerven 2013; Pinkovskiy and Sala-i-Martín 2014; and Beegle et al, 2016). The uncommon views among these sources revealed that such data issues including poor-quality data generated irregularly using less robust methods, and the use of varied conversion adjustment formulas by different data hosting institutions are relatively prominent in Africa.

These issues have often resulted in data related measurement errors, causing biases in econometric analysis due to endogeneity, thereby affecting the explanatory ability of independent variables. Indeed, the measures of productive entrepreneurship and institutional quality, the main independent variables of interest, are considered endogenous in the econometric model specification of this chapter. While some studies have often ignored these problems, making their results and inferences questionable, this study uses instrumental variables to extract the exogenous components of these endogenous variables and hence isolate their actual causal effects on PR.

From the literature reviewed in this study, potential instruments including Absolute Latitude, Log of settler mortality, Legal origin, and Ethnic Fractionalization index were identified for IQ, while others including the levels of annual mean rainfall, annual mean temperature, commodity import and export price indices, and the lagged values of per capita GDP were identified for PE. However, the study chooses Absolute Latitude over others for IQ, and the lagged value of the level of per capita GDP and term of interaction between the levels of annual mean rainfall and annual mean temperature amongst other for PE. These were chosen because of data coverage and most importantly because they satisfy the common properties of good instruments including high correlation with the endogenous variable, uncorrelated with the error term, and only impact the dependent variable through the endogenous variable.

Detailed descriptions of the selected Absolute Latitude and the lagged values of per capita GDP or its composition and the respective theoretical and conceptual explanations for which they are assumed to meet exclusion restrictions are presented in section 2.3.3 of this thesis report. Meanwhile, similar descriptions for the annual mean rainfall/precipitation and annual mean temperature are presented below.

Mean Rainfall and Mean Temperature as Instruments for Productive Entrepreneurship

This section of the study builds firstly on the theoretical and conceptual ideas of entrepreneurship as a factor of production and its sectoral importance. Secondly, it briefly discusses the understanding of Climate Change and its effects on sectoral economic activities. Thirdly, it presents an understanding of how the multiplier and intersectoral linkages among economic sectors make agriculture important in economic growth dynamics, and how the effect of Climate Change on one sector can considerably affect other sectors. These are finally followed by evidence-based conceptual and theoretical explanations of how mean temperature and mean rainfall, as instruments, meet exclusion restrictions.

Generally, economic growth is anchored on economic activities across sectors, mainly agriculture, services, and manufacturing/industry. Entrepreneurship is based on entrepreneurial capital as an endogenous factor of production and which explains long-run growth processes (Schumpeter, 1934; Kirzner, 1973; and Audretsch, 1995). It is indeed the forms of economic activities that occur across all sectors and serve as the major component that contributes to private sector development, which is the bedrock for economic growth. Thus, any factor that affects the production and productivity of economic activities also affect entrepreneurship activities across these sectors.

Climate Change is simply the seasonal patterns of temperature, rainfall/precipitation, winds, and cloud cover (Weil, 2013). It increases the risks of droughts, flooding, storms, forest fires, heat waves, heavy rains, and increase in sea level, which affects ecosystems, societies and economies (Stern, 2006). Expressed in literature including Stern (2006) and Atkin et al. (2024), Climate Change disproportionately make communities vulnerable, and affect a country’s agricultural production and productivity, water access and availability, energy, infrastructure, coastal areas, and non-agricultural economic activities including formal and informal services, manufacturing, and trading income generating activities. These effects in turn contribute to significant economic losses. For instance, Climate shocks from floods and storms destroys capital and disrupt supply chains that consequently decrease firm and worker productivity, as well as augment trade dynamics and generate negative externalities (Atkin et al., 2024).

While some primarily focus the effect of Climate Change on agriculture, others (Johnston and Mellor, 1961; Mellor, 1999; and Schneider and Gugerty, 2011) have explicitly presented theoretical framework on the multiplier and intersectoral linkages among agriculture and non-agriculture sectors. The framework reveals the importance of agriculture in the dynamics of structural transformation of the growth process, and so, makes it clear that in addition to independent effect of Climate Change on these non-agriculture sectors, any effect on agriculture also affects other sectors.

In the said framework, they argued that increased quantity of food supplies for domestic consumption due to increased agricultural productivity, in turn increases farmers' incomes and their demand for non-agricultural goods and services. That the increased agricultural productivity, coupled with increased demand for non-agricultural goods and services then released surplus agricultural labour for industry, to keep increased affordability for industrial workers, leading to increased non-farm household employment and incomes. Moreover, they argue that agriculture provides a domestic market for industrial output, serves as a supply of domestic savings, and as a source of foreign exchange. Moreover, while the process of structural transformation remains important in economic development, the Lewis (1954) model inherently explains that the non-agricultural growth, especially industrialization, is dependent upon the improvement of the indirect potential contributions of the rate of agricultural growth. He argues that the withdrawal of labour from agriculture or the absence of increasing agricultural productivity would eventually result in reduced food supply, increased food prices, and thus lower real wages in industry.

In line with the above background understanding, this study followed Miguel et al. (2004) and Burke and Leigh (2010) and uses mean temperature and mean rainfall/precipitation fluctuations/variations as instruments for economic growth and entrepreneurship as a key factor of production in the growth process. The argument is built on the fact that temperature and rainfall/precipitation are taken as given since it is impossible to have control over these variables. Hence, as considered in this study, these whether shocks variables provide sources of exogenous variations with direct implications for economic activity and thus exogenous to the growth-poverty model framework. In agreement with the above sources, it is argued based on the identification assumption that shocks from these weather instruments are not correlated with the error term and only influence the likelihood of changes in poverty through their impact on the measures of EG and its components (entrepreneurship). Indeed, Miguel et al., as well as Burke and Leigh and others (Benson and Clay 1998) argue based on the evidence that whether shocks are highly correlated with agricultural sector output, which accounts for a large share of the labour force in most developing countries, especially those in Africa. Also, Belloumi (2014) in analysing the impact of climate change on agricultural production in 11 Eastern and Southern African countries (ESA) reveals that annual precipitation positively affects agricultural production, while the overall increase in annual mean temperature decreases agricultural production.

Within a wider scope, it is emphasised that economic shocks to the agriculture sector are of general importance to aggregate growth and other sectors of the economy (Miguel et al., 2004; Tiffin and Irz 2006; and Burke and Leigh, 2010). For instance, Kalkuhl and Wenz (2018) in estimating the impacts of climate on economic growth found that in temperate and tropical climates, annual temperature shocks reduce gross regional product (GRP), while they increase GRP in cold climates. Burke and Leigh (2010) emphasised that whether shocks particularly rainfall variation is of direct importance to other water-intensive economic activities, such as hydroelectricity generation. Moreover, Dell et al (2008) show that weather shocks have an important impact on industrial output, and by extension argue that weather shocks also provide a source of exogenous variation that is likely to be uncorrelated with the incomes of some larger proportion of the population of many countries. Furthermore, Vermeulen et al. (2012) notes that rain-fed agricultural production systems are vulnerable to seasonal variability with associated labour and welfare effects such as inflationary effects, especially when there are large and sustained disruptions to domestic agriculture output. For example, the drier seasons that negatively impact crop production usually drive inflationary pressures worldwide, which may be exacerbated if production is disrupted in countries with a large controlling share of world food production (UNECLAC[3], 2009).

Also presented in Weil (2013, p. 464) on Climate and agricultural productivity, measures of agricultural output per worker differ greatly between tropical and temperate regions. He argues that workers in wealthy, temperate countries producing as much as 300 times the agricultural output of workers in poor, tropical countries. The book presented studies employing similar techniques on agricultural production function for different economies. The studies generally showed that even when differences in farm machinery, fertilizer inputs, and the human capital of workers are accounted for, agricultural productivity in tropical countries was found to be lower than in the temperate zone across studies. Specifically, one of the estimates reveals that using the same capital, labour, and fertilizer inputs, land in wet tropical climates produced 27% less and land in the dry tropics produced 31% less output than land in the wet temperate zone. Also, land in the dry temperate zone produced 15% less than land in the wet temperate zone. Accordingly, these results are not unconnected with the fact that tropical areas have longer growing seasons than do temperate regions. Moreover, closer inspection in these studies revealed that, by nature, tropical climates suffer from several disadvantages in producing useful crops. For instance, it was argued that although the tropics do receive heavy rainfall, the pattern in which the rain falls is not good for

[3] UNECLAC - *United Nations, Economic Commission for Latin America and the Caribbean*

farming. The studies pointed to the fact that in much of the tropics, rain falls seasonally, and that even where this seasonal pattern does not occur, tropical rain tends to fall in surges that can erode the soil. Similarly, as they argue, the seasonal pattern of sunlight in the temperate zones with long days in the summer and short days in the winter, as opposed to the relative constancy of sunlight in the tropics, is optimal for growing staple grains such as wheat and maize.

While identification results in this study were found to be consistent with the above existing evidence, the strength of the first-stage identification for changes and levels of annual precipitation and mean temperature were each not large enough to meet the identification criteria separately. To increase the strength of these first-stage identifications and to enhance the magnitude of the effects of annual rainfall and temperature variations on measures of EG for especially countries that largely depend on agriculture, this study interacts the two whether variations as employed by Ochieng et al. (2016) and Waidelich et al. (2024). It also follows Kalkuhl and Wenz (2018) who used interaction terms of the measures of these whether variations.

4.3.3 Description of the Data Set

The data set contains data on variables for measures of poverty, institutional quality, component measures of entrepreneurship used for productive entrepreneurship as one of the private sector development compositions of growth, gross domestic capital formation, population, share of labour force employed in population, and income inequality, which are captured in the analytical model. Data on instrumental variables (IVs) of interest to address endogeneity is also included. The data is obtained from different sources on economies across the global geographical regions of the world including low- and middle-income countries for the period 2002–2020. Useable data/observations come from a total of 80 Countries. This is distributed among six geographical regions as follows: 10 countries in East Asia and Pacific (EAP), 40 countries in Europe and Central Asia (ECA), 3 countries in the Middle East (ME), 12 countries in Africa, 13 countries in Latin America and the Caribbean (LAC), and 2 countries in South Asia (SA). See **Appendix 5C3** for a detailed list of countries by region with corresponding years for observations. Data is obtained over this period to allow for a comparative analysis of the effect of productive entrepreneurship on poverty reduction for African region relative to the global sample and those of other regions. However, regression analysis created exceptions in cases where the choice of selection of a country was limited by the lack of data on measures of poverty, entrepreneurship, and other variables of interest.

Drawn from review of the literature, this study has adopted entrepreneurship to be define as the ability and willingness of individual or group of individuals that perceive and initiate new profitable innovative/creative economic opportunities, introduce their ideas in the market in the face of risks and other obstacles through formal or informal form of business, and make sound management decision on location, form, and the use of resources and institutions.

While entrepreneurship is multidimensional and measured differently using data from different sources, this study uses data from the Global Entrepreneurship Monitoring (GEM) database on variables that make up the components of the measure of productive entrepreneurship, derived from their weighted average using Principal Component Analysis (PCA).

GEM is considered the most important institution for the provision of internationally harmonized assessment cross-country and comparable data on entrepreneurship activity over time, which enables understanding of the relationship between entrepreneurship and economic development (UNCTAD, 2004; Fernandez-Serrano et al., 2018; Lecuna, 2020; and Amorós et al., 2021). While focused on coverage of several countries, GEM examines the behaviour of adult individuals, measured in terms of the share of an economy's working-age population who are actively involved in entrepreneurship activities. This includes both early-stage entrepreneurship activities and established business ownership activities. Based on the above adopted definition of entrepreneurship, this study focuses on the set of total early-stage entrepreneurship activities defined as follows:

Total early-stage Entrepreneurship Activity (TEA) Measures the proportion of working-age adults aged 18-64 who are actively involved or trying to start a new business/firm they will own/co-own (nascent entrepreneurship) or already own and manage a new business/firm (owner-manager, known as new business ownership rate), which are not older than 42 months (3.5 years).

The GEM database contains different measures of entrepreneurial activity derived from the TEA, including the components of productive entrepreneurship described and adopted in this study. The PE component variables include improvement-driven opportunity-based entrepreneurial activity, innovation entrepreneurship (including the use of technolohy and research and development), and high job creation expectation rate entrepreneurship activity, briefly described below.

i. **Improvement-driven Opportunity-based Entrepreneurial Activity (IOEA):** Percentage of those involved in total early-stage entrepreneurial activity (TEA), who through improvement-driven motivation, (i) claim to be driven by opportunity as opposed to finding no other option for work; and (ii) who indicate that the main driver for being involved in this opportunity is being independent or increasing their income/wealth, rather than just maintaining their income.

ii. **High Job Creation Expectation Rate Entrepreneurship activity**, commonly known as high-growth expectation early-stage entrepreneurial activity, is a measure of the percentage of TEA who expect to create jobs for at least 6 employees in five years from now.

iii. **Innovation Entrepreneurship Activity,** commonly known as new product-market-oriented early-stage entrepreneurial activity is a measure of the percentage of TEA who indicate that they have used new technology in the last 1 to 5 years to produce their product or service that is new to at least some customers, and that few or no other businesses offer the same product or service.

For the measure of innovation entrepreneurship, this study follows Minnitia and Lévesque (2010) who focused on people or labour, mainly research-based entrepreneurs who are engaged in Research and Development (R&D) with its incurred expenditure, and imitative entrepreneurs who are engaged in imitative entrepreneurial activity to produce intermediate goods and services. The study thus considers both research-based entrepreneurs and imitative entrepreneurs for the measure of innovation/creative entrepreneurship. Indeed, both imitative and research-based entrepreneurs incur entrepreneurial costs, consisting of costs for setting-up and financing operations to produce intermediate goods and exploit profit opportunities (Minnitia and Lévesque, 2010). However, Research-based entrepreneurs are those willing to incur R&D expenditure to introduce original technological changes or discoveries for the purpose of commercialization to exploit profit opportunities thereby increasing competition, productivity and variety of intermediate goods. On the other hand, Imitative entrepreneurs mobilize resources to expand existing markets through innovation to produce imitative intermediate goods. Minnitia and Lévesque (2010) also argue that both types of entrepreneurial activities contribute to economic growth. They empirically show that, when the returns to R&D expenditure are low, such as in many developing and emerging economies, the presence of a high number of imitative entrepreneurs who increase competition and product supply is sufficient to generate economic growth regardless of the distribution of activity between research-based and imitative and despite low R&D expenditure. Moreover, they argued that while research-based entrepreneurs contribute to technological change, imitative entrepreneurs also contribute too but indirectly since the existence of imitative entrepreneurs threatens the rent of research-based entrepreneurs and gives them incentives to continue innovating to stay ahead of competition. Thus, relying on the measures generally used in literature for R&D (Research and development expenditure as a percentage of GDP and/or Researchers in R&D per million people) would ignore economies with limited or virtually non-existence of R&D expenditure, and entrepreneurs who are not engaged in R&D.

Table 3.1a below presents the PCA results for the different entrepreneurship variables used, whose weighted average is represented by Productive Entrepreneurship defined in this study.

Table 3.1a: Principal Components Analysis Results for Dimensions of Productive Entrepreneurship

Principal Components Correlation

Principal components/correlation	**Number of obs**	**903**
	No. of components	**3**
	Trace	**3**
Rotation: (unrotated = principal)	**Rho**	**1.000**

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	1.29283	0.309038	0.4309	0.4309
Comp2	0.983788	0.260401	0.3279	0.7589
Comp3	0.723386	.	0.2411	1

Principal Components (Eigenvectors)

Variable	Comp1	Comp2	Comp3	Unexplained
High job creation expectation rate (HJCER)	0.6948	-0.0804	-0.7147	0
Improvement-driven opportunity entre. Activity (IOEA)	0.2699	0.9502	0.1555	0
Innovation entrepreneurship (Innovn)	0.6666	-0.3009	0.682	0

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy

Variable	KMO
(HJCER)	0.5046
IOEA	0.5500
Innovation Entrepren.	0.5050
Overall	**0.5050**

Results of Horn's Parallel Analysis for principal components 180 iterations, using the p95 estimate

Component or Factor	Adjusted Eigenvalue	Unadjusted Eigenvalue	Estimated Bias
1	1.279573	1.292826	0.013254
2	0.978865	0.983788	0.004923
3	0.741563	0.723386	-0.01818

Criterion: retain adjusted components > 1

Table 3.1a reveals that the index of PE largely shares common features of the three independent growth-oriented entrepreneurship by extracting one main factor with eigenvalue 1.29283 to be retained. This is in line with the Kaiser Criterion (Kaiser, 1974), where the eigenvalue of the components to be retained should each be greater than one (≥1). Notwithstanding, all the three potential principal components are shown to explain all variances in all variables. This, as shown in Table 3.1a, is evidenced by Rho value = 1.000 from the principal components' correlation analysis, and by all the unexplained variances being zero each from the eigenvectors analysis. Additionally, the Measure of Sampling

Adequacy (MSA), commonly known as the Kaiser-Meyer-Olkin (KMO) statistics, are at least above the threshold value of 0.50 for each of the variables as well as the overall KMO statistics. This shows evidence of the appropriateness to use the PCA approach. To further ascertain these results, Horn's (1965) parallel analysis was also employed, which is more robust for adjusted eigenvalue criterion that determines the number of factors to be extracted by adjusting the original eigenvalues for sampling error-induced collinearity among the variables. The Horn's parallel analysis result is also consistent with the original Kaiser criterion. It shows that the one extracted factor displays an adjusted eigenvalue that is larger than 1, which is retained as a one-factor solution.

The study utilizes data on internationally comparable monetary poverty measures, mainly two poverty headcount measures, \$1.90 and \$3.20 per day (2011 PPP) poverty headcounts for low- and middle-income countries respectively. The data is obtained from the World Bank PovcalNet or Poverty Platform database. A detailed description of these measures and the reason for their selection is provided in **section 2.3.4** of this thesis report.

While national survey-based data for measures of both poverty and entrepreneurship are irregularly generated across countries, this study employs linear interpolation to align and maximize usable sample observations, and to enable application of the econometric estimation methods adopted.

As employed in previous empirical chapters (chapters 2 and 3) of this thesis, the study used, as measures of institutions, the six governance institutional quality indicators obtained from the World Bank Worldwide Governance Indicators (WGI) database developed by Kaufmann et al. (2019). These institutional quality indicators, include Voice and Accountability (VA), Political Stability and absence of Violence (PSV), Control of Corruption (CC), Rule of Law (RL), Regulatory Quality (RQ), and Government Effectiveness (GE). In addition to obtaining data on these indicators from different sources and sufficient and consistent availability of the data across many countries around the world for the period covered in this study, a detailed description of these measures and the reason for their selection is provided in **section 2.3.4** of this thesis report.

The study also followed other entrepreneurship-poverty empirical work (Amorós et al., 2021; and Van Le et al., 2022) and growth-poverty literature (Ravallion, 1995; Adams, 2004; Sembene, 2015; and Adeleye et al., 2020) that the poverty-reducing effect of the measures of growth and its compositions depend on the level of income inequality (or distribution).

Hence data on Gini-coefficient/index is captured in the dataset as a measure of income inequality and as a variable to control for the level of income distribution.

In line with empirical specification of this chapter of the thesis, data on other model control variables like gross domestic capital formation and share of labour employed in population were also captured in the dataset. Appendix **5A** presents a detailed description of the variables used in this study with the respective types, definitions, measurements, and data sources.

4.3.4 Analysis and Estimation Techniques

Consistent with previous empirical chapters, the study employed Pooled Ordinary Least Squares (POLS) and Two-Stage Least Squares (2SLS) estimation methods. This is mainly because the national survey-based poverty and entrepreneurship data are inconsistent and irregular in nature. So, following Gujarati (2015), the direct application of POLS estimation in such cases neglects the dual nature of time-series and cross-sectional data and assumes a model of constant coefficients across time and cross-section. While pooled OLS seems to be inadequate in addressing endogeneity problems, this study like others (Jaax, 2020; Venâncio and Pinto, 2020; Amorós et al., 2021; Benghalem and Fettane, 2021; and Van Le et al., 2022) also employed the 2SLS instrumental variable estimation. Provided in literature (Gujarati, 2015; Hill et al., 2018; Wooldridge, 2020; Hong, 2020; & Stock and Watson, 2020), instrumental variable estimation accounts for the potential endogeneity issues likely caused by omitted variable bias, reverse causality, and measurement errors in explanatory variables of interest. As a result, it permits the possibility of making inferences from data by accounting for both observed and unobserved effects.

For the multiple endogenous explanatory variables (entrepreneurship and institutional quality) and the corresponding interaction terms contained in the empirical analysis models, the study followed others by employing the use of multiple instruments (Baum, 2006; Cameron and Trivedi, 2009; Adkins & Hill, 2011; Gujarati, 2015; Hill et al., 2018; Wooldridge, 2020; & Stock and Watson, 2020). The sources argued that employing multiple instruments must require at least as many instrumental variables as there are endogenous variables. See details on theoretical and empirical analysis evidence provided in later section of this chapter (section 4.4.3.1) on tests for endogeneity and validity of instruments. Additionally, the study employed the use of robust standard errors to control for heteroskedasticity and serial correlation (Gujarati, 2015; & Wooldridge, 2020).

To avoid the limitations on the forms of institutions to use among the diverse sets that matter for the components of growth and development, this study in line with others (Perkins et al., 2013; and Torvik, 2020) used a mutually reinforcing broad cluster of institutional quality (IQ) dimensions. These sources defined a broad cluster of institutional quality as one that is representative of a combination of economic, political, social, and legal institutions and policies that matter for increased, sustained, and inclusive EG and improved development outcomes.

Following others (Knack and Keefer, 1995; Easterly and Levine, 2003; Le et al., 2015; Siyakiya, 2017; Doumbia, 2019; and Alonso et al., 2020) and in line with previous chapters in this report, this study constructed a weighted average IQ index using the Principal Components Analysis (PCA). This in line with others is because the Six World Governance Indicators (WGI) used for IQ are strongly correlated with one another and appear to measure the same broad governance concepts (Ouedraogo et al., 2022; Qamruzzaman et al., 2021; Nawaz et al., 2014; and Langbein and Knack 2010). Hence the study avoided the use of all the indicators simultaneously in one regression model, which likely would result in high multicollinearity problems. In addition to using the weighted average IQ index, and as robustness checks, this study further used the Six WGI indicators individually and compared the results obtained with the weighted IQ index.

Appendix 5B3 presents PCA results for the different institutional dimensions that shared characteristic representing the IQ index used in this study as the main resultant IQ. It can be seen in Appendix 5B3 that the index of IQ largely shares common features of the six independent World Governance Indicators represented by one main extracted factor to be retained and has an eigenvalue of 5.05742. This meets the threshold of the Kaiser Criterion (Kaiser, 1974) of eigenvalue greater than one (≥1) for components to be retained. Also, evidence from the principal components' correlation analysis shows that the potential components explain all variances in all variables (Rho value = 1.000), and besides, each of the unexplained variance being zero from the eigenvectors analysis. Moreover, in Appendix 5B3 the Measure of Sampling Adequacy (MSA) or Kaiser-Meyer-Olkin (KMO) statistics, is above the threshold value of at least 0.50 for the overall KMO statistic and for each of the variables, showing the appropriateness of using PCA. Furthermore, the main factor component has an eigenvalue greater than one, showing evidence of capturing 84.29% of the variance with all the six indicators loaded strongly on this factor. To ascertain these results, the Horn's (1965) parallel analysis was performed as a more robust adjusted eigenvalue criterion to decide on the number of factors to extract after adjusting the original eigenvalues for sampling error-induced collinearity among the variables. The result is also consistent with the Kaiser criterion of one extracted factor to be retained with adjusted eigenvalue greater than 1.

However, following Mooi et al. (2018), the 84.29% explained variance means a 15.71% to be accounted for, which shows the practical impossibility for a single factor to represent all the information included in the six governance indicators. The study thus uses these indicators individually (as each may represent different institutional dimensions of political, economic, social, legal, or a combination) to analyse their independent and interactive moderating effects.

Regression results are analysed and discussed at global sample level, which also accounts for cross-regional analysis to compare results across regions at both \$1.90 and \$3.20/day poverty headcounts. In addition to using regional dummy variables in the global sample to make it possible for regional analysis, and despite the limited sample for African economies, the study also employs independent regional cross-country level analysis for African region. In both the global and African sample analyses, the study assesses, by testing the hypothesis, whether the impact of the level of PE on the level of poverty is negative and statistically significant or not. It also tests whether the level of IQ, through interaction, significantly influences the effect of PE on PR globally and in the African region. Results are separately presented for estimation models with and without IQ and its interaction term(s) in both global and African cross-country samples at both \$1.90 and \$3.20/day poverty headcounts.

The first and second estimation equations correspond to equation 15 of the empirical specification model equations (see also **columns 1 and 2 of Tables 2, 3, and 5**), which represent the first empirical model, mainly without IQ and its interaction terms. The models in columns 1 and 2 present the global view respectively with one having no regional dummies and the other that controls systematically for regional dummies for estimating the effects of the level of PE on poverty. The inclusion of regional dummies in the estimation is to determine whether the level of poverty-reducing effect of productive entrepreneurship in the global sample differs between Africa and other regions across the world.

The third and fourth estimation equations, which represent the second theoretical and empirical model of the study (equation 16), respectively replicate the first and second estimation equations but account for IQ and its interaction terms. These correspond to equation 16 of the theoretical and empirical model equations (see also columns 3 and 4 of Tables 2 and 3, and columns 1 to 4 of Table 6), to determine the extent to which IQ influences the poverty-reducing effect of PE in the global sample. The fifth and sixth estimation equations, which are employed and focused on analysis of cross-country level sample, respectively replicate the first and third estimation equations, but limited to the African sample (see columns 5 and 6 of Tables 2, 3, and 6, as well as columns 3 and 4 of Table 5). These estimations examine whether there is evidence of the effect of PE on PR and whether IQ significantly influences the poverty-reducing effect of PE in the region.

4.4 Empirical Results and Discussions

4.4.1 Descriptive Statistics

Table 3.1b presents descriptive statistics for the minimum available sample. Over the study period, Table 3.1b shows that in the global sample, the mean levels of $1.90/day and $3.20/day poverty headcounts for countries included in the analysis are respectively 0.0261 and 0.0668. This ranges from a minimum of 0.00 (no poor) to a maximum of 0.139 (for $1.90/day) and 0.7864 for $3.20/day). Across regions, the smallest mean level of poverty headcount at $1.90/day is experienced in Middle East (ME) at 0.0039 (less poor), while the largest mean level of poverty headcount at $1.90/day is 0.2085 observed in Africa. Also, the smallest mean level of poverty headcount at $3.20/day is 0.0081 found in North America (NA), while the largest mean level of poverty headcount at $3.20/day is 0,5092 (significant poor) observed in Africa.

The average level of institutional quality (IQ) in the global sample is 0.7576 units. This generally appears to be spread across regions with relatively the lowest mean level in Africa (-0.4580 units) followed by South Asia (SA) (-0.3497 units). On the other hand, other regions appear to be at relatively much better mean levels of IQ as seen in NA (+1.6648), ECA (+1.1343), and Middle East (ME) (+0.1491) in the measured units.

The average level of productive entrepreneurship (PE) in the global sample is -0.0026 units. Such levels of PE vary across countries, ranging from a minimum of -2.7322 to a maximum of +2.7420 units. Across regions, the average level of PE appears to spread. The analysis in Table 3.1b reveals a relatively low level of PE in Africa at -0.3887 units, as well as in other regions including SA (-0.3200), EAP (-0.2054), and LAC (-0.1820) in the measured units. In contrast, similar average levels of PE appear to be relatively better in other regions like ECA (+0.0378), ME (+0.2110), and NA (+0.7930) in the measured units.

4.4.2 Correlation Analysis

Appendices 3A1a to 3A1d present correlation analysis results. From Appendices 3A1a and 3A1b, PE appears to be moderately and negatively correlated with the rates of poverty at both $1.90 and $3.20 per day poverty headcounts in the global sample. For the same measures of poverty, a similar negative and moderate correlation is obtained in the EAP, LAC, ECA, and African regions. On the other hand, while a positively moderate correlation between the measures of poverty and PE is observed in NA, there seems to be weak or no correlation in ME.

Also, in Appendices 3A1c and 3A1d there is evidence of moderately negative correlation between IQ and the poverty rates at the $1.90 and $3.20 per day poverty headcounts in the global sample as well as across all regions. While these correlation results cannot provide any evidence of causal relationship between measures of poverty and either of those of PE or IQ, the extent to which PE and IQ contribute to or causes PR can only be revealed from regression analysis results.

Table 3.1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Global Sample					
Level of poverty headcount at $1.90/day (hc_19)	829	0.0261	0.0599	0.0000	0.6139
Level of poverty headcount at $3.20/day (hc_32)	829	0.0668	0.1284	0.0000	0.7864
Level of productive entrepreneurship (Prd_Ent)	829	-0.0026	0.9071	-2.7322	2.7420
Level of institutional quality (IQ)	829	0.7576	0.9283	-1.2331	2.2343
East Asia & Pacific (EAP) Sample					
Level of poverty headcount at $1.90/day (hc_19)	74	0.0543	0.0755	0.0000	0.3170
Level of poverty headcount at $3.20/day (hc_32)	74	0.1780	0.2072	0.0023	0.6240
Level of productive entrepreneurship (Prd_Ent)	74	-0.2054	0.6770	-1.6421	1.3692
Level of institutional quality (IQ)	74	0.0748	0.7744	-0.9113	1.9133
Europe & Central Asia (ECA) Sample					
Level of poverty headcount at $1.90/day (hc_19)	506	0.0052	0.0112	0.0000	0.1045
Level of poverty headcount at $3.20/day (hc_32)	506	0.0134	0.0267	0.0000	0.1861
Level of productive entrepreneurship (Prd_Ent)	506	0.0378	0.8255	-2.7322	2.4019
Level of institutional quality (IQ)	506	1.1343	0.7749	-0.7567	2.2343
Latin America & Caribbean (LAC) Sample					
Level of poverty headcount at $1.90/day (hc_19)	152	0.0561	0.0423	0.0005	0.1879
Level of poverty headcount at $3.20/day (hc_32)	152	0.1337	0.0802	0.0037	0.3639
Level of productive entrepreneurship (Prd_Ent)	152	-0.1820	1.1978	-2.6131	2.7420
Level of institutional quality (IQ)	152	-0.0124	0.6001	-1.1003	1.3893
Middle East Sample					
Level of poverty headcount at $1.90/day (hc_19)	29	0.0039	0.0020	0.0000	0.0111
Level of poverty headcount at $3.20/day (hc_32)	29	0.0178	0.0115	0.0000	0.0450
Level of productive entrepreneurship (Prd_Ent)	29	0.2110	0.7078	-1.4231	1.7679
Level of institutional quality (IQ)	29	0.1491	0.8587	-1.2331	1.0043
North America (NA) Sample					
Level of poverty headcount at $1.90/day (hc_19)	36	0.0064	0.0040	0.0023	0.0125
Level of poverty headcount at $3.20/day (hc_32)	36	0.0081	0.0045	0.0024	0.0150
Level of productive entrepreneurship (Prd_Ent)	36	0.7930	0.3956	-0.1069	1.6091
Level of institutional quality (IQ)	36	1.6648	0.2026	1.2897	1.9178
South Asia (SA) Sample					
Level of poverty headcount at $1.90/day (hc_19)	8	0.1291	0.0432	0.0723	0.1872
Level of poverty headcount at $3.20/day (hc_32)	8	0.5092	0.0606	0.4528	0.6032
Level of productive entrepreneurship (Prd_Ent)	8	-0.3200	0.4484	-0.8991	0.3684
Level of institutional quality (IQ)	8	-0.3497	0.4946	-1.1853	-0.0508
African Region Sample					
Level of poverty headcount at $1.90/day (hc_19)	24	0.2085	0.1938	0.0025	0.6139
Level of poverty headcount at $3.20/day (hc_32)	24	0.4226	0.2450	0.0303	0.7864
Level of productive entrepreneurship (Prd_Ent)	24	-0.3887	1.0658	-2.0060	1.3937
Level of institutional quality (IQ)	24	-0.4580	0.5223	-1.1526	0.7635

4.4.3 Analysis and Discussion of Results

4.4.3.1 Results from Test for Endogeneity and Validity of Instrumental Variables

This study chapter, like previous chapters, also employs pooled ordinary least squares (POLS) and instrumental variable (IV) estimations for reasons already provided in section 2.3.5 of chapter two of this thesis. This current section presents analysis and discussions of preferred IV and POLS regression results for global and African sample regression models with and without IQ terms at US$1.90 and US$3.20 per day poverty headcounts. The chapter follows the same literature discussed in earlier chapters 2 and 3 of the thesis to conduct similar tests for endogeneity of models and regressors of interest (Durbin, 1954; Wu, 1973; & Hausman, 1978), as well as the tests for validity of instruments in the first-stage regressions (Baum, 2006; Kennedy, 2008; Cameron and Trivedi, 2009; Gujarati, 2015; Wooldridge, 2020; Stock and Watson, 2020; & StataCorp Reference Manual, 2023). The tests are conducted for models with single and multiple endogenous regressors.

For each regression model, the Durbin-Wu-Hausman (DWH) test is first conducted to test for endogeneity of the models and endogenous regressors. Discussions of theoretical tests are also presented following Kennedy (2008) as detailed in **section 2.4.3** of this thesis, testing whether the instruments are uncorrelated with the error term, especially for just or exactly identified cases. Indeed, discussions on the theoretical and conceptual reasons for the selected instrumental variables to meet exclusion restrictions are detailed in **sections 2.3.3 and 4.3.2** of this thesis report. In addition, the tests for validity of instruments are conducted and results from first-stage regressions analysis discussed.

Consistent with detailed discussions of the above literature on test statistics as provided in **section 2.4.3.1**, each of these tests take into consideration the corresponding test statistic thresholds and rule of thumbs. These include test statistics for Durbin-Wu-Hausman, Stock and Yogo (2005), the Bound et al (1995) partial R-square, and the Shea's partial R-square (Shea, 1997).

Four different models and respective potential endogenous regressors of interest are teste for endogeneity and instrument validity at $1.90 and $3.20 per day poverty headcounts as follows:

i. Test for endogeneity and instrument validity for non-regional dummy regression models without IQ terms
ii. Test for endogeneity and instrument validity for regional dummy regressions models without IQ terms
iii. Test for endogeneity and instrument validity for non-regional dummy regression models with IQ terms
iv. Test for endogeneity and instrument validity for regional dummy regression models with IQ terms

Table 3.2a presents analysis results on tests for endogeneity and instrument validity for regression models with non-regional dummy that do not capture IQ terms at $1.90 and $3.20 per day poverty headcounts. The table shows that the Durbin-Wu-Hausman tests p-value results in the global and Sub-Saharan Africa (SSA) samples at $1.90 and $3.20 per day poverty headcounts are all less than 0.05 (p-value < 0.05), revealing that the models and regressors tested are endogenous, hence preferred IV estimation to be consistent. For validity of instruments, Table 3.2a shows that the Stock and Yogo (2005) t-value ≥3.2 and F-statistic ≥10 thresholds in the first-stage regressions are met for all the models and regressors in the global and SSA samples.

Table 3.2a: Test for Endogeneity and Instrument Validity for non-Regional Dummy Regression Models without IQ Terms at $1.90 and $3.20 per day Poverty Headcounts

	$1.90/day poverty headcount measure		**$3.20/day poverty headcount measure**	
	Global sample without regional dummies	**Africa/SSA sample**	**Global sample without regional dummies**	**Africa/SSA sample**
Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using ***estat endogenous*** *or* ***ivendog*** *Stata commands)*	Ho: variables are exogenous: Durbin (score) chi2(1) = **(p = 0.0000)** Wu-Hausm.F(1,739) = **(p = 0.0000)**	Ho: variables are exogenous: Durbin (score) chi2(1) = **(p = 0.0091)** Wu-Hausman F(1,19) = **(p = 0.0153)**	Ho: variables are exogenous: Durbin (score) chi2(1) = **(p = 0.0000)** Wu-Hausman F(1,789) = **(p = 0.0000)**	Ho: variables are exogenous: Durbin (score) chi2(1) = **(p = 0.2330)** Wu-Hausman F(1,19) = **(p = 0.2978)**
Durbin-Wu-Hausman Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.0000**	**Prob>chi2 = 0.0196**	**Prob>chi2 = 0.0000**	**Prob>chi2 = 0.8858**
First Stage Regressions				
Endogenous variable	**PE**	**PE**	**PE**	**PE**
Instrumental variables				
Interaction term for log of annual mean rainfall and annual mean temperature (R_Tit)	-0.003*** (0.001)	-0.017*** (0.005)	-0.003*** (0.001)	-0.017*** (0.005)
Observations	745	25	789	25
R-square	0.0429	0.4952	0.0425	0.4952
Test for Instrument Validity				
t-value	-4.45	-3.30	-4.41	-3.30
F-value	19.8132	10.9229	19.4822	10.9229
Prob > F	0.0000	0.0035	0.0000	0.0035

PE *= Level of Productive Entrepreneurship*

Also, Table 3.2b reveals analysis of results on tests for endogeneity and instrument validity for multiple instrumental variable regression models with regional dummies that do not capture IQ terms at $1.90 per day poverty headcount. According to Table 3.2b, the Durbin-Wu-Hausman test statistic p-value in the global sample with regional dummies is less than 0.05 (p-value < 0.05), revealing that the model and regressors tested are endogenous, hence preferred IV estimation to be consistent. In terms of validity of instruments, the table shows that the Stock and Yogo (2005) t-value ≥3.2 and F-statistic ≥10 thresholds in the first-stage regression to be met for the model and regressors in all other regions except in Europe and Central Asia (ECA) that these values fall below the thresholds. Despite these short falls in

ECA, there is evidence of a strong significant correlation between the instrument and the regressor in that region. Moreover, there is evidence of very small differences between Partial R-square and Shea's partial R-square test statistics values. The evidence demonstrates that the instrumental variables used are valid and do explain a meaningful fraction of variability in the regressors. Similar test analysis results in **Appendix 3B1** for endogeneity and instrument validity are found at $3.20 per day poverty headcount.

Table 3.2b: Test for Endogeneity and Instrument Validity for Regional Dummy Regressions Models without IQ Terms at $1.90/day Poverty Headcount

	$1.90/day headcount poverty measure					
	Global sample with regional dummies					
Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using ***estat endogenous*** *or* ***ivendog*** *Stata commands)*	Ho: variables are exogenous: Durbin (sc.) chi2(3) **= (p = 0.0000)** Wu-Haum. F(6,729) = **(p = 0.0000)**					
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.0000**					
First Stage Regressions						
Endogenous variable	**PE*EAP**	**PE*ECA**	**PE*LAC**	**PE*ME**	**PE*SA**	**PE*Africa**
Instrumental variables						
Interaction between (R_Tit) and EAP region dummy	-0.001*** (0.000)					
Interaction between (R_Tit) and ECA region dummy		0.002** (0.001)				
Interaction between (R_Tit) and LAC region dummy			-0.005*** (0.001)			
Interaction between (R_Tit) and ME region dummy				0.002*** (0.000)		
Interaction between (R_Tit) and SA region dummy					-0.002*** (0.001)	
Interaction between (R_Tit) and Africa region dummy						-0.005*** (0.001)
Observations	745	745	745	745	745	745
R-square	0.1365	0.0260	0.1165	0.1271	0.3119	0.2838
Test for Instrument Validity						
t-value for instrument	-7.61	2.17	-8.97	8.48	-15.99	-15.87
F-value	14.1806	1.4111	14.2624	15.2122	50.168	46.8319
Prob > F	0.0000	0.2075	0.0000	0.0000	0.0000	0.0000
Partial R-Square	0.1038	0.0114	0.1043	0.1105	0.2905	0.2766
Shea's Partial R-Square	0.0989	0.0033	0.0332	0.0998	0.2322	0.2642

Note: *PE = Level of Productive Entrepreneurship; EAP = East Asia & Pacific; ECA = Europe & Central Asia; LAC = Latin America & Caribbean; ME = Middle East; SA = South Asia; and (R_Tit) = Interaction of natural log of annual mean rainfall/precipitation and annual mean temperature.*

Similarly, Tables 3.2c and 3.2d below present results on tests for endogeneity and instrument validity for multiple instrumental variable regression models that capture IQ terms with regional and non-regional dummies respectively at $1.90 per day poverty headcount. The two tables show that the Durbin-Wu-Hausman test statistic results are less than 0.05 (p-value < 0.05) each, revealing that the models and regressors tested are endogenous, and thus preferred IV estimations to be consistent. There are of course few indications of short falls in meeting Stock and Yogo (2005) thresholds, such as in the case of terms of interaction between productive entrepreneurship and institutional quality. Despite these, there are clear evidences of either a strong significant correlation between such regressor and the instrument(s) or evidence of very small differences between the Partial R-square and Shea's partial R-square test statistics. These demonstrate that the instrumental variables used are valid and largely explain meaningful variation in the regressors. Results presented in Tables 3.2c and 3.2d are similar test analysis results obtained in **Appendices 3B2 and 3B3** for both endogeneity and instrument validity at $3.20 per day poverty headcount.

Table 3.2c: Test for Endogeneity and Instrument Validity for Non-regional Dummy Regression Models with IQ Terms at $1.90/day Headcount Poverty Measure

	Global sample without regional dummies			**African sample**		
*Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)*	Ho: variables are exogenous: Durbin (score) chi2(3) **= (p = 0.0000)** Wu-Hausman F(3,694) = **(p = 0.0000)**			Ho: variables are exogenous: Durbin (score) chi2(3) **= (p = 0.0005)** Wu-Hausman F(3,13) = **(p = 0.0002)**		
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.0000**			**Prob>chi2 = 0.0061**		
First Stage Regressions						
Endogenous variables	**PE**	**IQ**	**PE*IQ**	**PE**	**IQ**	**PE*IQ**
Instrumental variables						
Interaction of log of annual mean rainfall & annual mean temp. **(R_T_{it})**	-0.006*** (0.002)					
Lagged value of the natural log of GDP per capita **(lnGDPpc_1)**				1.358** (0 .537)		
Absolute Latitude **(Lat_abs)**		4.061*** (0.432)			-30.078 ** (12.267)	
Interaction term of **R_T_{it} & Lat_abs [(R_T_{it})*(Lat_abs)]**			0.002 (0.003)			
Interaction term of **lnGDPpc_1 & Lat_abs [(lnGDPpc_1)*(Lat_abs)]**						3.073 (1.766)
Observations	704	704	704	23	23	23
R-square	0.1021	0.6416	0.0133	0.7752	0.687	0.6722
Test for Instrument Validity						
t-value for instrument	--3.09	9.40	0.53	2.53	-2.45	1.74
F-value	20.9338	90.3982	2.85013	11.3009	7.73405	5.24355
Prob > F	0.0000	0.0000	0.0367	0.0003	0.0021	0.0104
Partial R-Square	0.0827	0.2801	0.0121	0.6794	0.5919	0.4958
Shea's Partial R-Square	0.0327	0.1328	0.0081	0.1692	0.5065	0.1386

Note: *PE = Level of Productive Entrepreneurship; and IQ = Institutional Quality*

Table 3.2d: Test for Endogeneity and Instrument Validity for Regional Dummy Regression Models with IQ Terms at $1.90/day Poverty Headcount

	$1.90/day poverty headcount measure							
	Global sample with regional dummies							
Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using ***estat endogenous*** *or* ***ivendog*** *Stata commands)*	Ho: var are exog.: Durbin (sc.) chi2(3) **= (p = 0.0000)** Wu-Haum. F(8,684) = **(p = 0.0000)**							
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.0000**							
First Stage Regressions								
Endogenous variable	**PE*EAP**	**PE*ECA**	**PE*LAC**	**PE*ME**	**PE*SA**	**PE*Africa**	**IQ**	**PE*IQ**
Instrumental variables								
Interaction between (R_Tit) and EAP region dummy	-0.003*** (0.001)							
Interaction between (R_Tit) and ECA region dummy		0.004* (0.002)						
Interaction between (R_Tit) and LAC region dummy			-0.011*** (0.001)					
Interaction between (R_Tit) and Md. East region dummy				0.002*** (0.000)				
Interaction between (R_Tit) and SA region dummy					-0.002*** (0.000)			
Interaction between (R_Tit) and Africa region dummy						-0.006*** (0.001)		
Absolute Latitude **(Lat_abs)**							4.289*** (0.430)	
Interaction of R_Tit and Lat_abs **(R_Tit*Lat_abs)**								-0.1397*** (0.195)
Observations	704	704	704	704	704	704	704	704
R-square	0.1940	0.0679	0.1581	0.1303	0.3141	0.3288	0.6575	0.0365
Test for Instrument Validity								
t-value for instrument	--6.25	1.84	-8.99	5.00	-10.04	-11.31	9.97	2.77
F-value	17.2008	4.4678	14.5125	10.7925	35.3887	40.8659	39.2401	3.16456
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016
Partial R-Square	0.1659	0.0491	0.1437	0.1109	0.2903	0.3209	0.3121	0.0353
Shea's Partial R-Square	0.0787	0.0151	0.0507	0.0768	0.2632	0.2800	0.0554	0.0286

Note: *PE = Level of Productive Entrepreneurship; EAP = East Asia & Pacific; ECA = Europe & Central Asia; LAC = Latin America & Caribbean; ME = Middle East; SA = South Asia; and (R_Tit) = Interaction of natural log of annual mean rainfall/precipitation and annual mean temperature.*

4.4.3.2 Regression Results and Discussions

Table 3.3 presents results for regression model without IQ terms. In column 1 of Table 3.3, corresponding to model 1 without IQ terms and equation 15 of the study specification framework, results show as expected that the effect of PE on poverty is negative (coefficient = -2.52) and statistically significant in the global sample regression model without regional dummies at $1.90/day poverty headcount. Accordingly, given that a change of one standard deviation (SD) in PE is equal to 0.91 units, the evidence suggests that a one SD increase in the level of PE reduces extreme poverty by 92.7%[4].

In a non-IQ global sample regression model with regional dummies at the $1.90/day poverty headcount, column 2 of Table 3.3 reveals that the effect of PE on poverty is negative and

[4] *{[exp(-2.52*0.91)]-1}*100%*

statistically significant at coefficients of -2.407, -1.751, -5.433, -11.103, & -4.010 respectively in EAP, LAC, ME, SA, and African regions. Thus, with one SD changes in PE equal to 0.68, 1.20, 0.71, 0.45, & 1.07 in each region, the results suggest that a one SD increase in PE reduces extreme poverty in each region by 93.9%, 79.2%, 99.7%, 100%, & 98.1% respectively.

Despite the limited cross-country sample included for Africa in this study, column 5 of Table 3.3 presents for African sample without IQ terms. The table reveals that at $1.90/day poverty headcount, the effect of PE on poverty in the region is negative and statistically significant (coefficient = -1.504). Hence, a one SD increase in PE in this region (1.07 units) would reduce extreme poverty by 76.2% in that region. These results are in line with findings from other studies, which show that entrepreneurship reduces poverty (Slivinski, 2012; Aziz et al., 2020; Jaax, 2020; Afawubo and Noglo, 2021; Amorós et al., 2021; Rani and Kumar, 2021; Shirima, 2021; Van Lee et al., 2022; and Azamat et al., 2023) despite the different measures of entrepreneurship and poverty used in these studies.

At $3.20/day poverty headcount in the global sample presented in column 3 of Table 3.3, evidence on the effect of PE on moderate poverty is consistent with those obtained at the $1.90/day poverty headcount, despite the slight difference in magnitude of the coefficients (-2.377). As seen in column 4 of the table, evidence show that this effect is due to the significant contribution of PE to PR in Africa, since only in Africa in the global sample regression with regional dummies that the effect of PE on PR is shown to be negative and statistically significant (coefficient = -3.729). This is also confirmed by the significant result of the effect of PE on PR obtained from analysis of the African cross-country sample (coefficient = -0.503), which has the same significance level result as that at $1.90/day poverty headcount, despite the smaller magnitude of the coefficient.

While PE is a weighted average cluster of different entrepreneurship mechanisms or channels for contributing to development outcomes such as economic growth and PR, it means that developing economies should focus on designing and implementing policy and strategic mechanisms having larger proportion of nascent entrepreneurs (new businesses/firms to be owned) or new owner-manager (already owned and managed) firms. Such firms should be opportunity driven (with orientation of independence and increased income/wealth) by entrepreneurs who can recognise and utilize the opportunities through innovative ideas (including the use of new technology), and who are expected to create high and increased growth-oriented employment within the first five years and beyond.

Table 3.3: 2SLS IV Regression Results for Models without IQ at $1.90 and $3.20/day Poverty Headcount Measures

Dependent Variables: Natural log of $1.90/day ($lnhc_19_{it}$) and $3.20/day ($lnhc_32_{it}$) poverty headcount measures						
	Global Sample Models without IQ		**Global Sample without IQ**		**African Sample without IQ**	
	$lnhc\_19_{it}$		**$lnhc\_32_{it}$**		**$lnhc\_19_{it}$**	**$lnhc\_32_{it}$**
Explanatory variables	**Column 1**	**Column 2**	**Column 3**	**Column 4**	**Column 5**	**Column 6**
Productive Entrepreneurship (PE)	-2.520***		-2.377***		-1.504***	-0.503***
	(0.630)		(0.580)		(0.430)	(0.159)
PE * regional dummy variables						
East Asia and Pacific (EAP)		-2.407**		-4.447		
		(1.176)		(2.813)		
Europe & Central Asia (ECA)		-1.612		-7.385		
		(2.206)		(7.115)		
Latin America & Caribbean (LAC)		-1.751**		-2.875		
		(0.803)		(2.410)		
Middle East (ME)		-5.433***		-5.213		
		(1.918)		(4.568)		
South Asia (SA)		-11.103***		-9.306		
		(3.114)		(7.292)		
Africa		-4.010***		-3.729**		
		(0.774)		(1.881)		
Gross dom. capital formation (lnGdcf)	0.024	0.009	0.053***	0.083	-0.087*	-0.0517**
	(0.016)	(0.030)	(0.014)	(0.081)	(0.048)	(0.0247)
Labour force participation (lnLfpop)	-2.462***	-1.160	-3.183***	-2.847	-3.565	-1.422
	(0.706)	(0.913)	(0.645)	(1.868)	(3.421)	(1.752)
Gini Income Inequality (lnGini)	4.473***	5.160***	5.129***	3.974*	4.947***	2.054**
	(0.560)	(0.811)	(0.500)	(2.402)	(1.490)	(0.742)
Constant	-3.218***	0.199	-2.750***	-4.377	-0.149	0.257
	(0.955)	(1.918)	(0.832)	(4.993)	(2.808)	(1.465)
Observations	745	745	789	789	25	25
R-squared					0.553	0.564

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fourth columns*

For control variables, findings show that the effect of income inequality across all columns in Table 3.3 at both $1.90 and $3.20/day poverty headcounts measures is positive and statistically significant. The findings align with other empirical study results for entrepreneurship-poverty relationships (Amoros et al., 2021; and Van Le et al., 2022) and growth-poverty relationship (Ravallion, 1995; Ravallion and Chen, 2007; Christiaensen et al., 2011; Chuhan-Pole, 2014; Thorbecke, 2014; Bicaba et al., 2015; Sembene, 2015; and Adeleye et al., 2020). These sources argue that the rising level of income inequality is a major deterrent to the poverty-reducing effect of growth and its composition including entrepreneurship in developing countries across the globe and Africa in particular. Also, Table 3.3 (columns 1&3) reveals that at both poverty headcount measures, the labour force participation or employment expansion has a negative and statistically significant effect on poverty in the global sample regression models without regional dummies. However, this effect is insignificant in the cross-country African sample at both poverty headcounts. In the same table, there is evidence that the effect of gross domestic capital formation (GDCF) on both extreme and moderate PR is only significant in the African sample, while it significantly contributes to the rise in moderate poverty in the global sample at both poverty headcounts.

For model 2 with IQ terms, which corresponds to equation 16 of the empirical specification framework, Table 3.4 presents the results. In Column 1 of Table 3.4, findings reveal no independent statistically significant evidence of the effect of PE on extreme PR in a global sample without regional dummies at $1.90/day poverty headcount, even though the coefficient is negative as expected. Similar result of negative but insignificant effect of PE on extreme poverty is obtained as shown in column 5 of Table 3.4 for cross-country African sample. Despite the limited sample of countries and observations captured for the African region, these results are consistent with studies by Djankov et al. (2019) and Gu et al. (2021). These two studies account for IQ variable in their models using formal/registered new businesses density as a proxy for entrepreneurship, but found insignificant effects of independent entrepreneurship on PR.

However, a global sample regional dummy regression analysis presented in column 2 of Table 3.4 show as expected that the effect of PE on extreme poverty is negative and statistically significant in SA and African regions at $1.90/day poverty headcount with coefficients of -10.175 & -3.327 respectively. Thus, a one SD increase in PE in South Asia (SA) and Africa (0.45 and 1.07 units respectively) would reduce extreme poverty by almost 100% & 96.2% in the two regions. This result shows the extent to which private sector development through improved PE can be very important for PR in the two regions.

In columns 1 & 5 of Table 3.4, the causal effect of the level of IQ on extreme poverty is as expected found to be negative and statistically significant. Findings suggest that a one SD increase in IQ in the non-regional dummy global sample and the African sample (1.00 and 0.70 units respectively) would reduce extreme poverty by{exp(-1.07*1.00) -1}*100% or 66% in the global sample and {exp(-1.81)*0.70 -1}*100% or 71.8% in the African sample in each case at $1.90/day poverty headcount. These results are in line with other study findings, which showed evidence of significant effect of IQ on PR (Chong and Calderon, 2000; Hassan et al., 2006; Tebaldi & Mohan, 2010; Perera & Lee, 2013; Cepparulo et al., 2017; Djankov et al, 2019; Doumbia, 2019; and Fagbemi et al., 2020). Moreover, the result reveals that PE reduces poverty through a high IQ environment, despite the insignificant effect of PE on PR. Clear evidence for this can be seen in the negative and statistically significant effect of the term of interaction between IQ and PE on poverty.

Indeed, in column 1 of Table 3.4, the coefficient of the term of interaction between the level of IQ and PE from the 2SLS estimation results is negative and statistically significant at the $1.90/day poverty headcount. This implies that the extreme poverty-reducing effect of PE in global sample regression without regional dummies increases as the quality of institutions is increased. In column 1 of Table 3.4, the partial/marginal effect analysis results of the coefficient of interaction term at different percentile levels of IQ presented in Appendix **3C2** reveals that PE significantly reduces extreme poverty in a high IQ environment. In terms of the marginal effect of PE depending on IQ, the expression, based on column 1 regression model in Table 3.4, is given by:

$$\frac{\partial(lnPov)}{\partial(PE)} = 0.093 - 2.904\ (IQ)$$

Where IQ takes different percentile values, 0.093 is the conditional effect of PE, -2.904 is the marginal effect of strengthening IQ. Thus, in Appendix 3C2, the interaction effects of the overall impact of the interaction between PE and IQ on poverty are shown to range from -2.050 log units (75th percentile of IQ) to -5.887 log units (99th percentile of IQ). These results are due to all the dimensions of IQ at $1.90/day poverty headcount.

For cross-regional analysis in the global sample model with regional dummies, column 2 of Table 3.4 did not show any statistically significant effect of the term of interaction between IQ and PE on extreme poverty at the global level, despite the coefficient being negative.

However, for models with voice and accountability (VA) and regulatory quality (RQ) dimensions of IQ, columns 1 and 3 of Table 3.5 reveal that the effect of the interaction terms for PE and either of VA or RQ on extreme poverty is negative and statistically significant as expected. In these regional dummies global sample regressions for both VA and RQ dimensions of IQ, evidence show as expected that the effect of PE on extreme poverty is negative and statistically significant in SA and African regions. These results indicate that the extreme poverty-reducing effect of PE in SA and African regions increases as the level of the quality of VA and RQ institutional dimensions are each increased.

From the marginal effect analysis results of the coefficient of interaction term at all levels of both VA and RQ, Appendix 3C3 and 3C4 reveal that PE significantly reduces extreme poverty at all percentile values of VA and RQ in the two regions. Although not significant, evidence also shows the moderating influence of VA and RQ on the poverty-reducing effect of PE at critical percentile values of the two IQ dimensions in other regions, especially Middle East (ME) and Latin America and the Caribbean (LAC) as shown in Appendices 3C3 and 3C4. In terms of the marginal effect of PE depending on IQ, the expressions, based on columns 1 and 3 regressions in Table 3.5, are given by:

$$\frac{\partial(lnPov)}{\partial(PE)}_{in\ SA} = -13.192 - 2.128 * (VA) \quad and \quad \frac{\partial(lnPov)}{\partial(PE)}_{in\ SA} = -8.242 - 2.412 * (RQ)$$

As well as,

$$\frac{\partial(lnPov)}{\partial(PE)}_{in\ Africa} = -3.381 - 2.128 * (VA) \quad and \quad \frac{\partial(lnPov)}{\partial(PE)}_{in\ Africa} = -2.902 - 2.412 * (RQ)$$

Note: PE = Level of Productive Entrepreneurship; and lnPov = level of poverty

Table 3.4: 2SLS IV Regression Results for Models with IQ at \$1.90 and \$3.20/day Poverty Headcount Measures

Dependent Variables: Natural log of \$1.90/day ($lnhc\_19_{it}$) and \$3.20/day ($lnhc\_32_{it}$) poverty headcount measures						
	Global Sample with IQ		**Global Sample with IQ**		**African Sample with IQ**	
	$lnhc\_19_{it}$		**$lnhc\_32_{it}$**		**$lnhc\_19_{it}$**	**$lnhc\_32_{it}$**
Explanatory variables	**Column 1**	**Column 2**	**Column 3**	**Column 4**	**Column 5**	**Column 6**
Productive Entrepreneurship (PE)	0.093		-0.289		-1.303	-0.642
	(0.837)		(0.560)		(0.783)	(0.535)
Institutional Quality (IQ)	-1.074**	-1.745***	-1.195***	-1.896***	-1.809***	-1.166***
	(0.476)	(0.581)	(0.318)	(0.537)	(0.554)	(0.378)
PE*IQ	-2.904*	-1.252	-1.847*	-0.151	-1.237	-0.615
	(1.615)	(0.796)	(1.058)	(0.782)	(1.554)	(1.061)
PE * regional dummy variables						
East Asia and Pacific (EAP)		2.336		-0.402		
		(1.455)		(1.428)		
Europe & Central Asia (ECA)		2.902*		3.090*		
		(1.565)		(1.612)		
Latin America & Caribbean (LAC)		0.365		0.836		
		(0.742)		(0.788)		
Middle East (ME)		-2.521		-2.766		
		(2.368)		(2.379)		
South Asia (SA)		-10.175***		-10.090***		
		(3.110)		(3.206)		
Africa		-3.327***		-2.198***		
		(0.804)		(0.836)		
Gross dom. capital formation (lnGdcf)	-0.003	-0.053*	0.018	-0.044	-0.023	-0.017
	(0.023)	(0.030)	(0.016)	(0.030)	(0.061)	(0.042)
Labour force participation (lnLfpop)	-0.248	3.502**	-0.622	2.404	-2.501	-2.040
	(1.318)	(1.718)	(0.932)	(1.582)	(3.084)	(2.106)
Gini Income Inequality (lnGini)	3.183***	2.646**	3.407***	3.124***	7.311***	3.688***
	(1.104)	(1.208)	(0.723)	(1.067)	(1.728)	(1.180)
Constant	-0.842	2.594	-0.553	2.932	1.278	-0.043
	(1.435)	(1.694)	(1.062)	(1.744)	(2.855)	(1.949)
Observations	704	704	744	744	23	23
R-squared					0.7216	0.5193

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fourth columns*

From above, and as presented in Appendices 3C3 and 3C4, the overall effects of the interaction between PE and VA on extreme PR in SA are found to range from -11.218 log units (25^{th} percentile value) to -15.935 log units (99^{th} percentile value). In Africa, the overall interaction effects of PE and VA on extreme PR ranges from -0.796 log units (25^{th} percentile) to -5.417 log units (99^{th} percentile). In the case of RQ, the overall effects of PE and RQ interaction on extreme PR in SA ranges from -6.194 log units (25^{th} percentile) to -10.718 log units (99^{th} percentile). In a similar vein, the overall interaction effects of PE and VA on extreme PR in Africa ranges from -0.224 log units (25^{th} percentile) to -5.358 log units (99^{th} percentile).

A noticeable observation is the reduction in the magnitudes of the Gini elasticities of poverty from higher magnitudes/values observed in columns 1 to 4 of Table 3.3 (regression models without IQ terms) to corresponding relatively lower Gini elasticities of poverty in columns 1 to 4 of Table 3.4 (with regression models with IQ terms), showing that appropriate and high IQ environment increase income distribution. Such observations of improved income distribution as a result of the presence of good governance institutional environment leading to PR are consistent with the work of Khan (2011) on good governance and distribution in a working paper on Governance, Growth and Poverty Reduction. Khan (2011) argued that it is possible to have an increased impact of good governance reforms on poverty reduction by improving income distribution in poor countries, even in cases where good governance reforms may have an anomalous effect on growth (and in this study, its compositions). This, as he revealed, can happen primarily in two ways: First, through good governance reforms focusing on pro-poor service delivery as a way of government accountability through investment in human capital and increased access of the poor to potential resources for increased employment/job opportunities (including entrepreneurship related employment). Second, through the protection of property rights and efficient rule of law, and through anti-corruption policies and democratization. These two pathways theoretically allow the poor to protect their rights better, demand better services from the state, and ensure that a greater part of the public goods that they are entitled to are in fact delivered.

The above results show that the level of IQ is important for extreme PR in the global sample, and its influence on the poverty-reducing effect of PE increases (higher magnitude of negative values) as the quality of institutional environment is improved, especially in the South Asia and African regions. These findings align with the theoretical perspectives of inclusive institutional establishment or reforms (Engerman and Sokoloff, 1997, 2002; Acemoglu et al., 2001 & 2002; Szirmai, 2005; & 2008; Acemoglu and Robinson, 2012; Bluhm and Szirmai, 2012; Goel and Karri, 2019; and Si et al., 2020). The results also align with empirical evidence on the influence of high quality and inclusive institutions on the poverty-reducing effect (Aziz et al., 2020; and Gu et al., 2021) and income distribution-increasing effect (Asamoah et al., 2021) of entrepreneurship, despite using formal/registered new business density entrepreneurship. The sources argue that inclusive institutions provide a more likely encouraging environment for entrepreneurship that creates productive jobs and allows people including the poor to become entrepreneurs and hence participate in and the benefits of growth process. In line with these sources, this study also presents convincing evidence that inclusive institutions enhance the effect of PE on PR in developing countries largely at global level, especially those that encourage easier and more sustainable formation and development of entrepreneurial activities through venture creation, research and development, and introduction of modern and efficient innovations and technology. This could be in countries/societies with efficient governments regarding civil service independence and high-quality public service delivery, and institutional environment with less burden of regulations (on cost of starting and running businesses, investment, labour, trade, private sector participation, access to credit, etc.). Moreover, the countries could have higher quality and transparency of the rule of law, especially in enforceability of contracts, protection of secured property rights and intellectual property; and increased constraints on the actions of political and other elites from not expropriating others' innovation and incomes. Also, such countries should have more effective corruption control systems, greater accountability and civil liberties, and provisions of equal opportunity for all that would allow the participation of citizens in governance and economic activities.

Despite the considering other institutional factors, countries in South Asia and African regions in particular, could specifically focus on creating and strengthening capabilities necessary for efficient market-friendly institutional environment with less burden of regulations (on businesses, investment, labour, trade, private sector participation in development interventions, access to credit, etc.) and higher quality and transparency of the rule of law. These countries should also engage in reforms that enhance capabilities that promote institutional stability. greater accountability and civil liberties, and provisions of equal opportunity for all that would allow the participation of citizens (including the poor) in economic activities and in governance as a means of holding the state to account to deliver to them.

Despite the slight differences in the magnitude of the coefficients, findings from analysis of regression at the \$1.90/day poverty headcount are very similar to those obtained at \$3.20/day poverty headcount for the second model, which captures IQ and its interaction terms, and corresponds to equation 16 of the theoretical model/framework. Similar to 2SLS IV regression results for model 1 without IQ terms, findings show that the coefficient of the level of income inequality across all columns in Table 3.4 at both \$1.90 and \$3.20/day poverty headcount is positive and statistically significant. The findings align with other empirical study results (Ravallion, 1995; Ravallion and Chen, 2007; Christiaensen et al., 2011; Chuhan-Pole, P., 2014; Thorbecke, 2014; Bicaba et al., 2015; Sembene, 2015; Adeleye et al., 2020; and Van Le et al., 2022). However, there is no statistically significant evidence for the effects of GDCF and the labour force participation on PR in columns 1, 3, 4, 5, and 6 of Table 3.4 containing the terms of PE, IQ and their interaction at the two poverty headcounts in both global and African samples, even though the coefficients are negative.

Table 3.5: 2SLS IV Regression Results for Models with Voice and Accountability & Regulatory Quality at $1.9 and $3.2/day Poverty Headcount Measures

Dependent Variables: Natural log of $1.90/day ($lnhc_19_{it}$) and $3.20/day ($lnhc_32_{it}$) poverty headcount measures			
	Global Sample with Voice and Accountability (VA) & Regional dummies		**Global Sample with Regulatory Quality (RQ) & Regional dummies**
	$lnhc\_19_{it}$	**$lnhc\_32_{it}$**	**$lnhc\_19_{it}$**
Explanatory variables	**Column 1**	**Column 2**	**Column 3**
Productive Entrepreneurship (PE)			
Institutional Quality (VA/RQ)	-1.774***	-2.077***	-1.454***
	(0.657)	(0.535)	(0.492)
PE*(VA/RQ)	-2.128**	-1.402*	-2.412**
	(0.877)	(0.753)	(1.210)
PE * regional dummy variables			
East Asia and Pacific (EAP)	3.104*	0.661	2.298
	(1.777)	(1.519)	(1.557)
Europe & Central Asia (ECA)	2.545	3.212**	1.428
	(1.646)	(0.456)	(1.250)
Latin America & Caribbean (LAC)	-0.202	0.227	0.633
	(0.731)	(0.667)	(0.724)
Middle East (ME)	-2.622	-3.217	-2.075
	(2.540)	(2.225)	(2.347)
South Asia (SA)	-13.192***	-13.660***	-8.242***
	(3.399)	(2.986)	(3.141)
Africa	-3.381***	-2.121***	-2.909***
	(0.883)	(0.789)	(0.803)
Gross dom. capital formation (lnGdcf)	-0.064*	-0.068**	-0.010
	(0.039)	(0.032)	(0.030)
Labour force participation (lnLfpop)	3.389*	2.641*	1.783
	(1.860)	(1.495)	(1.335)
Gini Income Inequality (lnGini)	3.251***	3.905***	4.373***
	(1.040)	(0.830)	(0.906)
Constant	3.257	4.545	2.198
	(2.049)	(1.739)	(1.567)
Observations	705	745	705
R-squared			

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the first, second and third columns*

4.5 Conclusion and Implications

Huge theoretical and empirical evidence continue to recognise sustained and inclusive EG as an important source of PR and improved standard of living. Meanwhile, entrepreneurship is emphasised as a major component of private sector development (PSD), and an important knowledge factor of production that better explains long-run growth process and its contribution to PR, job creation and other development outcomes. However, the multidimensionality concepts and measures of entrepreneurship makes it challenging to link the individual behavioural level measures to aggregate development outcomes. While measured differently, there is lack of evidence in literature that employed models that used a representative indicator/variable measure that captures the common characteristics shared by the theoretically identified growth-oriented entrepreneurship types/measures.

Also, empirical evidence argued that the effect of entrepreneurship on EG and PR depends on the quality of governance, institutional, and macroeconomic policy environment. This study is the first to construct and use productive entrepreneurship (PE) as a precise measure of entrepreneurship. PE is a measure of the weighted average of growth-oriented entrepreneurships including improvement-driven opportunity (formal and informal as well as all forms of businesses/firms), high job creation expectation, and innovation/creative (new products/services for customers and use of new technology) entrepreneurships.

Previous entrepreneurship empirical studies that addressed endogeneity largely employed the techniques of GMM and 2SLS for one endogenous variable. While entrepreneurship and IQ are potentially endogenous, this study employs Pooled OLS and multiple instrumental variable estimations for at least two endogenous variables using data on PE, poverty, IQ and control variables from various sources for the period 2002-2020. It investigates the effect of PE on PR and the extent to which IQ influences the effect of PE on income PR at global level and in Africa relative to other regions.

While previous studies have used different measures that may not well reflect the theoretical and multidimensionality concepts of entrepreneurship, this study finds that PE has significant effect on extreme PR at global and regional levels. Indeed, where there is lack of previous comparative regional empirical evidence on the causal relationship between entrepreneurship and income poverty, this study finds that PE significantly reduces extreme poverty at global level and across regions including Africa. The study thus demonstrates that the effect of PE on PR does not necessarily depend on the level of per capital income of economies, but largely on the extent to which the measure of entrepreneurship account for theoretically growth-oriented dimensions, and the behavioural multidimensionality.

Since PE is a cluster of growth-oriented entrepreneurship channels for contributing to development outcomes such as PR, it means that developing economies should focus on designing and implementing policy and strategic mechanisms having larger proportion of nascent entrepreneurs with new owner-manager businesses/firms. Such firms should be opportunity driven with orientation of independence and increased income/wealth by entrepreneurs who can recognise and utilize the opportunities through innovative ideas (including the use of new technology), and who are expected to create high and increased growth-oriented employment within the first five years and beyond.

In addition, while IQ is found to contribute significantly to PR in global and cross-country African samples, the effect of the term of interaction between PE and the average weighted IQ on PR is statistically significant at global level. This indicates that IQ is important for the poverty-reducing effect of PE globally. Such moderating effect is large for PE in a high IQ environment, where the effect of institution is due to the other World Governance Indicators apart from political stability and absence of violence.

Across regions, the effect of the term of interaction between PE and weighted average IQ on PR is negative but insignificant. However, the effects of the terms of interaction between PE and each of Regulatory Quality (RQ) and Voice and Accountability (VA) dimensions of IQ on PR are each negative and statistically significant in developing regions especially Africa and South Asia. The moderating effects of RQ and VA institutional dimensions on the poverty-reducing effect of PE occur at all percentile levels of these institutional dimensions in Africa and South Asia. Evidence also shows that such moderating effects occur at critical threshold levels of RQ and VA institutional dimensions in other regions like the Middle East, Latin America and Caribbean, and Europe and Central Asia. Overall, while PE significantly reduces poverty, its poverty-reducing effect depends on the quality of institutional environment. This effect of PE on PR is larger in a high-quality institutional environment, for VA and RQ institutional dimensions across these regions.

Thus, while there is lack of evidence in literature on the moderating effect of IQ on the income poverty-reducing effect of entrepreneurship, this study clearly reveals evidence of significant influence of strong and inclusive IQ environment on the poverty-reducing effect of entrepreneurship. Most importantly, the evidence also demonstrates that the limited contribution of entrepreneurship to income PR can be improved by PE type and the moderating influence of IQ on the poverty-reducing effect of PE globally and across regions. This shows that in an effective and high IQ environment, PE matters for PR in developing countries/regions. Hence, governments in low- and middle-income countries, including those in Africa, should therefore focus on creating and strengthening the quality of inclusive institutional and policy environment that attract private sector investments and effective participation of the poor in entrepreneurship. This should be through reforms that prioritize good governance framework.

Such framework should encompass the rule of law with strengthened legal and judiciary systems that ensure contract enforcement and property rights, control of corruption that only encourages less/no corrupt practices, and effective and accountable government work force with adequate resources (finance, human, and material) for effective and efficient policy designs and implementation. The framework should also be anchored on regulatory fiscal policies that mandate the lowest cost of doing business (including less tax and trade tariffs burden, and minimal registration procedures), and monetary policies with less inflation and interest rates for increased access to finance through credit facilities thereby encouraging the private sector to invest in entrepreneurship.

Despite the evidence of statistically significant effect of PE on PR at global and regional levels including Africa, entrepreneurial businesses and small and medium enterprises (SMEs) are found to be primarily very small in Africa. In fact, the SMEs account for about 95 per cent of all African firms (Bloom et al., 2014). These smaller firms are less effective in absorbing new technology, they export less than larger firms and thus make them less useful for macroeconomic balance and sustained growth, and the workers in small enterprises have less access to decent on-the-job training than employees of larger firms (Naudé and Krugell, 2002; Bloom et al., 2014: 39; and Muriithi, 2017). Moreover, about half of new small businesses fail within three years, with five out of seven new businesses fail within a year in Africa; and even for those that do survive usually make only a modest contribution to the growth process. While the high failure rates of small businesses remain a global phenomenon, especially for the ones with very limited or no wage employment opportunities, Cramer et al. (2020) argue that most of these failed businesses/firms are particularly managed by young people. Since young people have limited management knowledge and skills, the businesses they manage have failed at much higher rates than larger firms in existence for over 10 years employing at least 100 workers with better wages and working conditions.

With evidence of significant effect of PE on PR, this study recommends the design of effective interventions to enhance the knowledge of management practices for increased performance/productivity of such businesses/firms. These interventions, at the initial stage, should be targeted at high-ability entrepreneurs. This thus requires reliable tools to identify and select such entrepreneurs as they would be important for the dynamics of productivity growth and those that relate to the functioning of markets. For such interventions, further research evidence would be needed on the differences in firm capabilities and the type of interventions with minimum effectiveness to raise their capacities. While Climate Change shocks and economic recession often destroy capital and disrupt supply chains and hence decrease firm and worker productivity, government should create an enabling environment for large as well as SMEs to be resilient and better adapted to these shocks. This could be through access to credit and capital for purchased insurance against the expected shocks. Also, government and the private sector should support investments in and encourage the adoption of efficient technologies and provision of job-loss insurance to protect firm workers in sector-related activities exposed to Climate shocks or zones.

Additionally, economists often argue in support of clustering small businesses/firms together to form associations or SME clusters or cooperatives to enable their economies of scale and hence escape the obstacles such as high transaction costs that prevent small farms and enterprises from succeeding (Bloom et al., 2014 and Cramer et al., 2020). However, Cramer et al. (2020) revealed that borrowers in such groups bear the sole burden of selection, monitoring, and the enforcement that would otherwise be faced by the lender. They further argued that cooperatives and small-scale enterprises often fail to serve the interests of their poorest members. They rather mostly serve the interests of small set of members with larger capital, who obtains the greatest benefits from access to mobilised resources or inputs and higher priced market opportunities.

However, evidence from this study clearly reveals the importance of voice and accountability and regulatory quality dimensions of good governance institutional quality for the poverty-reducing effect of entrepreneurship, especially in developing regions like Africa. Voice and accountability measure the ability of institutions to protect civil liberties, extent of citizens participation in the selection of government, equal opportunity for all, transparency of the business environment, and the extent of institutional accountability. Regulatory quality measure the performance ability of institutions on the burden of regulations on business, private sector participation, and which requires efficient rule of law for effective regulations. While these two institutional dimensions are strategically placed in organizational governance, this study recommends that governments of developing countries, as the prime institutional regulatory body, creates the enabling institutional environment that can allow the effective formation and governance of small business/firm clusters or cooperatives. The reform framework will take into consideration the protection of the interests and benefits of all members including the poorest with all the members (holding large or small capital) bearing the risks of burden of monitoring and enforcement faced by the group and not only the lead borrowers.

Commonly observed across models is the significant contribution of income inequality to poverty, thus providing evidence of the level of income inequality as a key factor constraining the contribution of PE, a component of EG, to PR. However, the striking evidence observed is the reduction in the magnitudes of the income inequality elasticities of poverty from higher magnitudes/values observed in regression models without IQ terms to the corresponding relatively lower magnitudes in regression models with IQ terms, showing that appropriate and high IQ environment increase income distribution. This is in line with Khan's (2011) proposition that it is possible to have an increased impact of good governance reforms on poverty reduction by improving income distribution in poor countries. He argues that this may primarily occur through good governance reforms focusing on pro-poor service delivery as a way of government accountability through investment in human capital and increased access of the poor to potential resources for increased employment/job opportunities (including entrepreneurship related employment), but also through the protection of property rights and efficient rule of law, which are necessary for effective regulatory quality.

Moreover, there is evidence that in models without IQ, the level of gross domestic capital formation (GDCF) has significant effect on PR in cross-country African sample, while the level of labour force participation (LFP) has significant effect on PR in the global sample. This reveals the importance of both GDCF and LFP for PR in the study models. Thus, strategies to enhance the poverty-reducing effect of PE should also prioritise increased private sector investment and mechanisms for addressing unemployment and income inequality related issues.

This means that government should create an inclusive growth framework with IQ and policy environments that encourage the design and implementation of pro-poor economic development strategies. In line with Tamvada (2010) and Lecuna (2020), the framework should accommodate PE support programmes largely focused on the poor, especially the low-income/wealth and less educated segments of the country's labour force to strengthen the wellbeing of the greater proportion of those in the bottom low-income bracket.

Following findings from literature reviews, the effect of entrepreneurship on PR depends on the access to finance, infrastructure facilities, human capital endowment, and not just the quality of institutional/governance and macroeconomic policy environments. This study thus proposes, for future research, the use of an indicator variable, such as knowledge economy that account for these factors as well as entrepreneurship in its measurement, to explore its effect on different measures of income and non-income poverty as well as income distribution. Additionally, while poverty and PE data is limited for robust empirical studies in developing countries and regions, future research should focus on the use of extended and updated poverty and PE datasets to further examine the causal effect of PE on PR in developing countries.

CHAPTER FIVE: GENERAL CONCLUSION AND IMPLICATIONS

5.1 Introduction

The long-standing and ongoing fight to achieve PR in all forms as a major development goal has consistently focused on the extent of its responsiveness to EG, especially in developing countries. Despite the overwhelming theoretical, empirical, and development policy initiative support to the importance of EG as the primary partway to poverty alleviation, there still remains inconclusive evidence, as others argue that EG alone is insufficient for rapid and sustained PR. Indeed, many countries in Africa including those in SSA fall within the group of countries faced with such paradoxical situations, where the remarkable EG over the last two-three decades has not effectively contributed to proportionate PR in the region.

The existing literature reviewed in this thesis suggests that the insufficient contribution of growth to rapid PR in Africa provides evidence of inconclusiveness in literature on growth-poverty relationship. The literature argues that the constrained translation may be due to the fact that increased income does not automatically translate into PR and improved quality of life because of certain factors that affect growth acceleration and its poverty-reducing effect. Such factors identified in literature include the measures/types of growth and the quality of data used, the model specifications and estimation methods employed for evidence-based development policies, changes in income distribution and population growth, and the level of availability of resources (finance, human, and infrastructure). Other critical factors include types/measures of sectoral economic activities of growth including its compositions of private sector development initiatives such as entrepreneurship, and the allocation of labour resources across these sectors for sustained and inclusive EG and PR. The quality of institutions and governance environments are also identified as major contributing factors but are in turn recommended in literature to largely influence the other factors identified above and the participation of the poor in the process of EG and its contribution to PR in developing countries.

However, robust empirical studies reviewed have each only used one among the different measures of aggregate EG. Besides, none of the studies employed the same robust estimation methods to compare the effect of EG on PR across different measures of growth commonly employed in literature.

Also, evidence shows that the greater proportion of increased population growth in Africa is concentrated in the rural settings largely engaged in agriculture. Concurrently, empirical studies based on structural dualism and sectoral growth theories (Lewis, 1954; Rostow, 1960; Fei and Ranis, 1964; and Chenery et al., 1986) have revealed evidence of relatively high significant contribution of agriculture value-added growth to PR than growth originating in the non-agriculture sectors like services and industry/manufacturing. However, review of the current study reveals that in SSA, there is low agricultural LPG, and that its effect on PR is insignificant relative to services and manufacturing sectors. Evidence in literature reveals that it is due to the limited impact of public expenditure on applying scientific innovations, including irrigation, for improved and high-yielding crop varieties to transform rural communities in Africa, and the heterogeneous production environments (Cramer et al., 2020; Ogundari and Bolarinwa, 2018; and Porteous, 2020). The same literature argue that it is because of the unsuitable agroecologically growing conditions for inputs, and the relatively high cost of those inputs with low farmgate prices received for output in the region. Other sources posit that it is due to limited agricultural research programmes and scientific knowledge about the infrastructure and crops mixes that are particularly important in Africa (Cramer et al., 2020; and Gollin, Hasen, and Wingender, 2018). Moreover, most African countries are engaged in free trade of export crops, leading to the decline in food grains availability and growth rate, and hence contribute to the low per capita output (Patnaik, 2016; and Traore and Sakyi, 2018). Also, while the huge effort towards providing credit and extension services to improve the productivity of smallholder farms in SSA, there is limited evidence of impact of the work of extension officers on improving agricultural productivity of these farms in Africa (Bernstein et al., 2019; and Cramer et al., 2020).

The same theories of structural dualism and sectoral growth also claimed that economic development occurs in the context of structural transformation that leads to increased productive jobs/employment, which is the key to growth in output per worker, increased income of workers and hence economywide growth necessary for rapid PR. While empirical evidence supports the claim elsewhere, the current study review indicates the lack of rapid structural transformation and its limited contribution to average LPG in SSA. This, according to the literature reviewed in this study, is dominated by vulnerable employment in the low-productivity informal services sector that has limited potential for markets in and outside the region. Moreover, it is argued that the rapid EG in Africa is concentrated in the extractive primary natural resources commodity exports-driven growth sector. However, the sector has limited share of the labour force and limited backward spillover linkage with other sectors and hence lack pro-poor potential in most African economies (Mcmillan & Rdrik, 2011; 2014; De Vries et al, 2015; Berardi and Marzo, 2017; Fox et al, 2017; and Diao et al., 2019).

Other sources emphasized the lack of required infrastructure, human capital, technical skills and innovations, and the level of private sector investment and participation to establish a high value-addition productivity extractive industries in Africa (Filmer and Fox, 2014; and OECD, 2018; and Yamada et al., 2018). In addition to the poor performance of schools and graduates in terms of decline in literacy and numeracy levels, the same sources also point to the shortage of Technical and Vocational Education and Training (TVET) equipment and qualified staff for in-demand skills and occupation training. Besides, the sources argued that the limited collaboration between TVET institutions and employers has caused a mismatch between the demand for and supply of skilled labour and thus reduced the learning ability of youth to adapt to changes in the pattern of labour demand.

Despite emphasising the importance of entrepreneurial private sector development initiatives for PR and welfare improvement, the existing literature reviewed in this study indicates that the inconclusive empirical evidence on the poverty-reducing effect of entrepreneurship, largely due to the types/measures of entrepreneurship and the data sources used. According to literature, entrepreneurship is an individual behavioural-based multidimensional concept that lack a unified measure to link its effect from individual level to aggregate development outcomes like EG and PR (Wennekers and Thurik, 1999; Audretsch et al., 2006; UNCTAD, 2004; Carree and Thurik, 2003 & 2010; and Avanzini, 2011). Moreover, while review in this study identified the measures of growth-oriented entrepreneurships, these measures are largely used individually or in forms that do not represent all the characteristics of growth-oriented aspects. Because all the growth-oriented measures are EG increasing, this study constructs and uses productive entrepreneurship variable/indicator that captures the features that these measures have in common, to examine the poverty-reducing effect of entrepreneurship.

The review in this study generally reveals that the constraints on the contribution of EG and its compositions to PR may be influenced by the quality of governance, policy, and institutional environments, even when the lack of these also create further challenges. High quality of these factors, as argued, can influence income distribution, efficient mobilization and allocation of resources, and the effective participation of the poor and women and the youth in development process for broad-based inclusive and sustained EG and its contribution to rapid PR. Indeed, while a set of theoretical and empirical evidence have identified institutions and good governance as determinants of sustained EG, other economic development theories and policy frameworks have claimed that high IQ influences EG and the extent of its translation into PR. Despite these claims and recommendations in literature, no robust empirical study has employed in its model, the direct introduction of the interaction between EG and the measure of institutions for the moderating influence of IQ on income poverty-reducing effect of EG, particularly in SSA. Also, despite the limited contribution of impressive growth to PR in SSA, no rigorous empirical study has examined the extent to which IQ influences, through interaction, the translation of sectoral compositions of EG and structural transformation into PR. Moreover, while there are differences in the effects of different measures of entrepreneurship on income and non-income poverty measures, there is no robust empirical studies on the moderating effect of IQ on the income poverty-reducing effect of productive entrepreneurship as constructed in this study.

This study thus employs pooled OLS and 2SLS multiple instrumental variable estimations on data for the period 1990-2020 to investigate the poverty-reducing effects of three measures of aggregate EG across models, the sectoral patterns of EG, and PE at the global level and in SSA relative to other regions. It also examines the moderating influence of governance IQ on the poverty-reducing effect of the said various dimensions of EG at the global level and in SSA compared with other regions. These align with the objectives of the three empirical chapters (chapters 2, 3, & 4) of the study respectively on the different measures of EG, the sectoral patterns of EG, and productive entrepreneurial private sector development and the corresponding nexus moderating relationships with IQ for PR.

5.2 Main Findings, Implications and Contributions to Literature

5.2.1 The Nexus of Institutions, Aggregate Economic Growth, and Poverty: Key Findings, Implications and Contributions to Literature

Findings reveal that the effect of each of the three measures of aggregate per capita economic growth on poverty is negative and statistically significant at global level and across regions including SSA. This contrasts findings by Adams (2004), the only previous but non-robust study that compared the effects of two measures of growth on poverty and found a negative and statistically significant effect of mean income growth on poverty but a negative and insignificant effect of WDI GDP per capita growth on poverty. Thus, while Adams (2004) argues that the poverty-reducing effect of EG depends on the measure of growth, this study demonstrates that the effect of EG on poverty does not depend on the measure of aggregate growth, but rather largely depends on the estimation methods employed and the quality of institutional environment.

Despite accounting for income inequality across the different growth models in this study, the growth elasticities of poverty observed across regression models are relatively larger at global and regional levels, compared with those obtained in literature. Even the least growth elasticities of poverty observed in SSA across growth regression models are relatively larger in size than those found in literature (Kalwij and Verschoor, 2007; and Fosu, 2017). This might be associated with the presence of the terms of IQ in the models, revealing the possibility of such meaningful growth effects on PR. Such observation is consistent with the work of Khan (2011), who argues that good governance reforms are highly likely to improve income distribution in poor countries, even in situations where good governance is seen to have an anomalous effect on growth. Thus, since income distribution, poverty, and growth are arithmetically related, an increased growth with increased income distribution would consequently cause the increased impact of growth on poverty reduction.

Indeed, the effect of the interaction term for IQ and each of the measures of per capita growth on poverty is negative and statistically significant at global level and across regions including SSA, despite IQ independently tending to contribute to poverty. In fact, results show that each of the PWT and WDI GDP per capita growth has a slightly larger effect size on extreme poverty than the survey mean income growth in high institutional quality environment in SSA. Thus, while there are scarce or no robust empirical studies that utilises the terms of interaction between IQ and EG directly in the model specifications to examine the influence of IQ on the income poverty-reducing effect of EG, this study provides evidence as a contribution to literature. It demonstrates that the income poverty-reducing effect of different measures of EG significantly depends on the level of IQ and its dimensions with larger effect size of EG on PR in a high IQ environment at global level and across regions including SSA.

Consistent with the Kuznets's (1955) theoretical hypothesis on the relationship between economic inequality and the level of GDP per capita growth, such observation for the independent effect of IQ on poverty to be positive and statistically significant is possible. That inequality increases at the initial stage of economic development while GDP per capita growth is increased, which only benefits a small segment of the population. In line with Khan (2007) and Acemoglu and Robinson (2012), this means that increased institutional quality intuitively tends to be poverty-reducing in the long-run rather than in the short-run. They argued that effective institutional reforms are usually accompanied by changes, including efficient resource allocation and creative destruction that initially reduces income distribution and hence increase poverty. This eventually subsides as the reform take-off with more people employed in higher income sectors, leading to increased income and income distribution, hence increased PR.

5.2.2 The Nexus of Institutions, Sectoral Patterns of Growth, and Poverty: Key Findings, Implications and Contributions to Literature

The study, in line with literature, has revealed statistically significant poverty-reducing effects of services and agriculture value-added and the corresponding labour productivity growth, as well as structural change and sector productivity growth at global level. However, while literature revealed evidence of relatively high significant contribution of the agriculture sector to PR than non-agriculture sectors, this study shows contrary evidence of insignificant effects of agriculture value-added and labour productivity growth on PR in SSA, despite the concentration of the larger proportion of the region's population in the sector. Literature has attributed the limited agricultural productivity and its contribution to growth and PR with a number of challenges in SSA such as limited agricultural research programmes and scientific knowledge about innovations including irrigation and important crops mixes. It is also due to the limited impact of the work of extension officers on improving productivity of smallholder farms, unsuitable agroecologically growing conditions for inputs, high cost of inputs with low farmgate prices for output, and the increased engagement of African countries in free trade of export crops leading to decline in food grain availability and its contribution to per capita output.

This study thus recommends the adoption of best practices in cultivation and enhancement of capacity of farmers for increased access to and adoption of modernized farming and high yield varieties that positively respond to modern implements, which attract increased public and private sector demand to investment in the sector. Since technological advancement is low in SSA countries relative to countries in other regions, governments should provide resource support to actors and create the enabling policy and institutional environments that encourage investments in agricultural research and development for instance to enable the development of large numbers of new varieties for rapid rates of diffusion.

While structural transformation is theoretically and empirically known to be important for sustained growth and PR via industrialization, this study reveals insignificant effects of manufacturing/industry value-added and labour productivity growth on PR at global level, as well as insignificant effects of structural change and industry value-added and labour productivity growth on PR across regions including SSA. Indeed, an analysis of this study presented in A**ppendix 2E** reveals consistent reductions in the average shares of real value-added, and labour employed in agriculture accompanied by the increase in these shares for the services sector, while the corresponding shares for manufacturing/industry sector seems to be relatively stagnated over the study period across regions, including SSA. This is consistent with evidence of pre-mature de-industrialization in the case of SSA with informal and vulnerable employment absorbed from the agriculture sector into the non-agriculture services sectors, despite the industry sector substantially contributed to the rapid growth through extractive primary commodity exports. Literature has also attributed these to the lack of required infrastructure, human capital, technical skills and innovations, and the limited private sector investment and participation to establish a high value-addition productivity extractive industries in Africa. Moreover, it is due to the low literacy and numeracy levels, and the shortage of TVET equipment and qualified staff for in-demand skills and occupation training.

This study recommends in line with Cramer et al. (2020) that developing countries including SSA should focus their industrial policies on increased manufactured exports demand as a productive force to influence investment incentives that are clearly associated with increasing returns, direct and indirect generation of employment as well as foreign exchange. While focusing on these rapid rates of growth of export volumes and earnings, governments should also design investment strategies to stimulate the rapid rate of growth of imports, especially of producer inputs and capital goods that incorporate an effective exchange rate policy relevant for acceleration of sustained growth and structural change. While there are more poor people concentrated in the non-farm activities across regions including SSA, this study recommends policies designed to promote investments in economic activities with increased demand for unskilled and less educated non-farm labour (including women and youth) in higher productivity activities as well as wage-labour-intensive goods and services for increased export growth and foreign exchange earnings.

Furthermore, while there is no previous evidence on the influence of IQ, through direct introduction of the interaction term in the model, on the poverty-reducing effects of sectoral components of EG, this study clearly demonstrates that IQ and its dimensions in one way or the other enhance the sectoral compositions of growth and significantly influence their poverty-reducing effects. Indeed, findings show that, at global level, IQ significantly enhances the poverty-reducing effects of services and agriculture value-added growth, while it significantly enhances moderate poverty-reducing effects of industry value-added growth. Regulatory Quality (RQ) and Government Effectiveness (GE) significantly enhance the poverty-reducing effects of agriculture labour productivity growth. Across regions, IQ significantly enhances the poverty-reducing effects of services value-added growth in South Asia and SSA. RQ and Control of Corruption (CC) significantly enhance the poverty-reducing effect of services labour productivity growth in other regions including SSA. Also, Voice and Accountability (VA) significantly enhances the poverty-reducing effect of agriculture value-added growth, while VA and Rule of Law (RL) significantly enhance the poverty-reducing effects of industry value-added growth across regions including SSA. However, while at least two institutional dimensions enhance the poverty-reducing effects of other measures of sectoral growth compositions, only VA institutional dimension significantly influenced the poverty-reducing effect of structural change, not at global level, but across regions, especially in EAP and to a lesser extent in other regions including SSA.

5.2.3 Nexus of Institutions, Productive Entrepreneurship, and Poverty: Key Findings, Implications and Contributions to Literature

In chapter 4, evidence shows that while previous studies have used different measures that do not well reflect the theoretical and multidimensionality concepts of entrepreneurship, this study finds that Productive Entrepreneurship (PE) has significant effect on extreme PR at global and regional levels. Indeed, where there is lack of previous comparative regional empirical evidence on the causal relationship between entrepreneurship and income poverty, this study finds that PE significantly reduces extreme poverty across regions including Africa. While the study clearly demonstrates consistency of the effect of PE on PR at global level and across regions, such effect does not necessarily depend on the level of per capital income of economies, but largely on the behavioural multidimensionality of entrepreneurships and the extent to which the measure of entrepreneurship account for theoretically growth-oriented dimensions as in the case of PE used in this study.

While PE represents a weighted average cluster of growth-oriented entrepreneurship channels for development outcomes such as PR, it means that developing economies should focus on designing and implementing policy and strategic mechanisms having larger proportion of nascent entrepreneurs with new owner-manager businesses/firms. Such firms should be opportunity driven with orientation of independence and increased income/wealth, by entrepreneurs who can recognise and utilize the opportunities through innovative ideas (including the use of new technology), and who are expected to create high and increased growth-oriented employment within the first five years and beyond.

Finding also show that IQ contribute significantly to PR at global level and across regions including African, and that the effect of the term of interaction between PE and IQ on PR is statistically significant at global level. Such moderating effect is large for PE in a high IQ environment, where the effect of institution is due to the other World Governance Indicators except for Political Stability and Absence of Violence. Across regions, the effect of the term of interaction between PE and weighted average IQ on PR is negative but insignificant. However, the effects of the terms of interaction between PE and each of RQ and VA dimensions of IQ on poverty are each negative and statistically significant in developing regions, especially Africa and South Asia. Evidence also shows that such moderating effects occur at critical threshold levels of RQ and VA institutional dimensions in other regions like the Middle East, Latin America and Caribbean, and Europe and Central Asia. Overall, while PE significantly reduces poverty, its poverty-reducing effect depends on the quality of institutional environment. This effect of PE on PR is larger in a high-quality institutional environment, for VA and RQ institutional dimensions across these regions.

Thus, in the absence of evidence in literature on the influence of IQ on the income poverty-reducing effect of entrepreneurship, this study clearly reveals evidence of significant influence of strong and inclusive IQ environment on the poverty-reducing effect of entrepreneurship. Most importantly, the evidence also demonstrates that the limited contribution of entrepreneurship to income PR can be improved by PE type and the moderating influence of IQ on the poverty-reducing effect of PE globally and across developing low- and middle-income regions including those in Africa. Hence, governments in these countries should focus on creating and strengthening the quality of inclusive institutional and policy environment that attract private sector investments and effective participation of the poor in entrepreneurship. This should be through reforms that prioritize good governance institutional framework.

Despite evidence of significant effect of PE on PR, literature argue that entrepreneurial businesses and small and medium enterprises (SMEs) are primarily very small in African. The firms are less effective in absorbing new technology with less access of workers to decent on-the-job training than employees of larger firms, have less export potential than larger firms, and hence contribute less to sustained growth (Naudé and Krugell, 2002; Bloom et al., 2014: 39; and Muriithi, 2017). Moreover, these small firms in Africa, particularly those managed by young people, often with limited management knowledge and skills, are faced with high failure rates at early stages, mainly within a year, and even for those that do survive usually make only a modest contribution to the growth process (Cramer et al., 2020).

This study thus recommends the design of effective interventions to enhance the knowledge of management practices for increased performance/productivity of firms targeted at high-ability entrepreneurs at the initial stage of interventions. For such interventions, research evidence would be needed on the differences in firm capabilities and the type of interventions with minimum effectiveness to raise their capacities. Hence the need for reliable tools to identify and select such entrepreneurs for informed dynamics of productivity growth and functioning of the markets. Additionally, while Climate Change shocks and economic recessions often destroy capital and disrupt supply chains and hence decrease firm and worker productivity, government should create an enabling environment for large as well as SMEs to be resilient and better adapted to these shocks to maintain productivity and higher earning work. This could be through access to credit and capital for purchased insurance against the expected shocks. Also, government and the private sector should support investments in and encourage the adoption of efficient technologies and provision of job-loss insurance to protect firm workers in sector-related activities exposed to Climate shocks or zones.

5.2.4 Policy Implications for Institutions and Measures of Economic Growth

Despite being argued in literature that EG matters but also insufficient for rapid PR, this study reveals that high IQ environment enhances the rapid poverty-reducing effect of growth in developing regions including SSA. It also reveals evidence on which IQ dimensions and the measures of growth and its compositions that complement or substitute one another in their contributions to PR. This means that governments and policy makers in low- and middle-income countries, including those in SSA, should prioritize reforms for strengthening mutually reinforcing political and economic institutional environment. This should be integrated within the growth-enhancing and efficient market-enhancing governance framework that responds to diverse governance and institutional concerns.

Such responses could be through efficient and accountable delivery of public goods and services including those that are pro-poor as ways of government accountability. This might be through re-allocation of resources to invest in increased relative equal rights and access to services and empowerment, and increased access of the poor to potential resources for increased employment/job opportunities that encourage the participation of people in the growth process. The reform efforts should give due consideration to improvement in skilled human capital development. It might also be through the protection of property rights, efficient rule of law, and effective anti-corruption policies and democratization. These together or independently promote less costs in market transactions (including low-cost contracting and barriers to doing business) and support private sector initiatives and investments as well as new/advanced technological talent and innovation/creativity. Such reforms should ensure attraction of public and private investments in sectoral activities including human and infrastructure as well as technological capacity development for efficient workforce and accountable and transparent delivery of public goods and services.

This in turn maximizes attraction of capital investment with new/advanced technologies, and hence inclusive and sustained long-run growth necessary for rapid PR.

With evidence on the transformation linkage between agriculture and services sectors, this study calls for inclusive institutional and policy reforms in developing countries including SSA, that encourage effective participation of the poor in the process and benefits of services and agriculture sector growth. Indeed, while the services sector is swollen by informal employment in the SSA region, the reforms should focus on policies and institutions that attract increased public and private sector investments in rural infrastructure and skills capacity building of non-farm employees and farmers (in appropriate farming technologies). The reforms should also encourage steady state accumulation of human capital (education and skills training) that drives long-run income and the growth of sectors, such as through diversification into farm-related services and industry activities supported by adoption of improved production and processing techniques. This allows interdependence among sectors, stimulating demand for and production of industry-related agricultural commodities, thereby enhancing agricultural transformation into modern activity. The reform environment should encourage efficient taxation, accountable and transparent natural resource governance, and management of effective public spending in sectors that largely contribute to PR. Moreover, reforms should focus on policies and interventions that promote Private Sector Development (PSD) as a driver of productivity growth and structural transformation. This can be achieved by addressing constraints to PSD through enhancing the enabling environment for creating and sustaining new businesses, increasing access to finance, improving access to market, attracting trade and foreign direct investment, and increasing human capital.

5.2.5 Effect of Control Variables on Poverty Reduction: Key Findings and Implications

For control variables, results reveal that the coefficient of the growth rate of income inequality is positive and statistically significant across regression models in Chapters 2, 3 and 4. This is in line with previous studies, which show evidence of increased contribution of the growth rate of income inequality to poverty, and as such, diminishes the impact of EG and its compositions on PR. This generally means that any efforts to enhance the contribution of EG or its composition to PR should also prioritise addressing income distribution issues, especially focusing on policies for improving EG and income distribution concurrently in a manner with positive or little effect on growth, and also without hurting the poor as pathways to sustained prosperity and economic development.

While the significant contribution of income inequality to poverty, a common observation across models in Chapter 4 is the evidence of reduction in the magnitudes of the income inequality elasticities of poverty from higher magnitudes/values observed in regression models without IQ terms to the corresponding relatively lower magnitudes in regression models with IQ terms. This in line with Khan's (2011) proposition shows that an appropriate and high IQ environment makes it possible for an increased impact of good governance reforms on poverty reduction by improving income distribution in poor countries. Khan (2011) argues that this may primarily occur through good governance reforms focusing on pro-poor service delivery as a way of government accountability through investment in human capital and increased access of the poor to potential resources for increased employment/job opportunities (including entrepreneurship related employment), but also through the protection of property rights and efficient rule of law, which are necessary for effective regulatory quality.

Furthermore, the study finds in Chapters 2 and 3 that human capital measured in terms of initial levels of education index (the average of the indices of early and mean years of schooling) and of life expectancy have statistically significant effects on PR across regressions models employed. While important for PR, these variables also proved important to enhancing the significant contributions of EG and its compositions to PR. Thus, efforts to improve EG and its contribution to rapid PR in developing countries should also give due consideration to improvement in skillful educational human capital development even in the face of crisis. These may include the maintenance or increased government and private sector investments and development intervention expenditures and investments in improved literacy and education levels (especially among the female and youth), vocational and on-the-job training skills development, and improved healthcare services and food and nutrition intake. The effort should also address the factors that influence improvement in life expectancy gains, while employing mechanisms for reduction in total fertility rate that would dappen population growth. These may include development interventions for improved healthcare including reproductive health services such as increased access to contraceptives for leveling fertility rate, access to safe water and hygiene as well as living conditions, food and nutrition intake, socio-economic status, early childhood development, advances in medicine and medical technology, and reduction in inequality of all forms. Notwithstanding, the effort should account for other factors necessary for human capital development, including improvement in infrastructure development (transportation and communication) and technological innovations as well as the quality of institutions.

Additionally, findings presented in Chapter 2 reveal that the aggregate and sectoral growth rate of Labour Force Participation or employment expansion have negative and statistically significant effects on poverty, as well as generally important for increasing the effect of EG compositions on PR. Thus, development intervention to enhance the contribution of EG or its composition to PR should also take along addressing unemployment issues, especially among the poor as well as women and the youth. Moreover, in Chapter 4, evidence from models without IQ shows that Gross Domestic Capital Formation has a significant effect on PR in Africa, while the labour force participation has significant effect on PR at the global level. Thus, intervention strategies to enhance the poverty-reducing effect of PE should also prioritise increased private sector investment and mechanisms for addressing unemployment and income inequality related issues. This means that government should create an inclusive growth framework with IQ and policy environments that encourage the design and implementation of pro-poor economic development strategies. In line with Tamvada (2010) and Lecuna (2020), the framework should accommodate PE support programmes that are largely focused on the poor, especially the low-income and less educated segments of the country's labour force to strengthen the wellbeing of the greater proportion of the poor.

5.3 Limitations and Future Research Directions

While this study clearly reveals the importance of high IQ environment for increased poverty-reducing effects of growth and its compositions, it recommends that future studies should focus on exploring the types of policies and IQ dimensions that create the enabling environment for improving EG and income distribution concurrently and the corresponding translations into rapid PR.

Additionally, while poverty, entrepreneurship, and sectoral growth and employment data is limited in developing countries and regions for long-run robust empirical studies, future research should focus on the use of extended and updated datasets for measures of poverty and growth and its components measures including PE to further examine their causal effects on PR in developing countries.

Also, the study calls for future country-level case studies to further explore individual country factors that enhance policies and good governance and institutional environment for improvement in broad-based and sustained EG as well as income distribution. Notwithstanding, empirical studies should consider the effect of sectoral growth and PE on non-income dimensions of poverty and other monetary measures of poverty such as the poverty gap (intensity of poverty) and squared poverty gap (severity of poverty).

In the robustness regression models (the Bourguignon Model), additional control variables are included, which account for the dependence of growth elasticity of poverty on the initial level of income inequality and on the level of development or location of the poverty line, and the respective terms of interactions with other variables. Not focusing on addressing potential endogeneity for these interaction terms containing growth, apart from the interaction term for growth and IQ as done in this study, might biase the poverty-reducing effects of growth and its term of interaction with IQ in the Bourguignon Model. As emphasised, this might be the reasons for the statistically insignificant effects of independent growth and its terms of interaction with IQ on PR. Further studies should therefore employ estimation methods that address the potential endogeneity of not only the model and independent growth terms, but also the endogeneity of the introduced interaction terms containing measures of growth. Such estimation techniques should appropriately employ 2SLS multiple instrumental variables and/or other empirical methodology such as System GMM following the step-by-step recommendations provided by Bazzi and Clemens (2013) and Kraay (2015).

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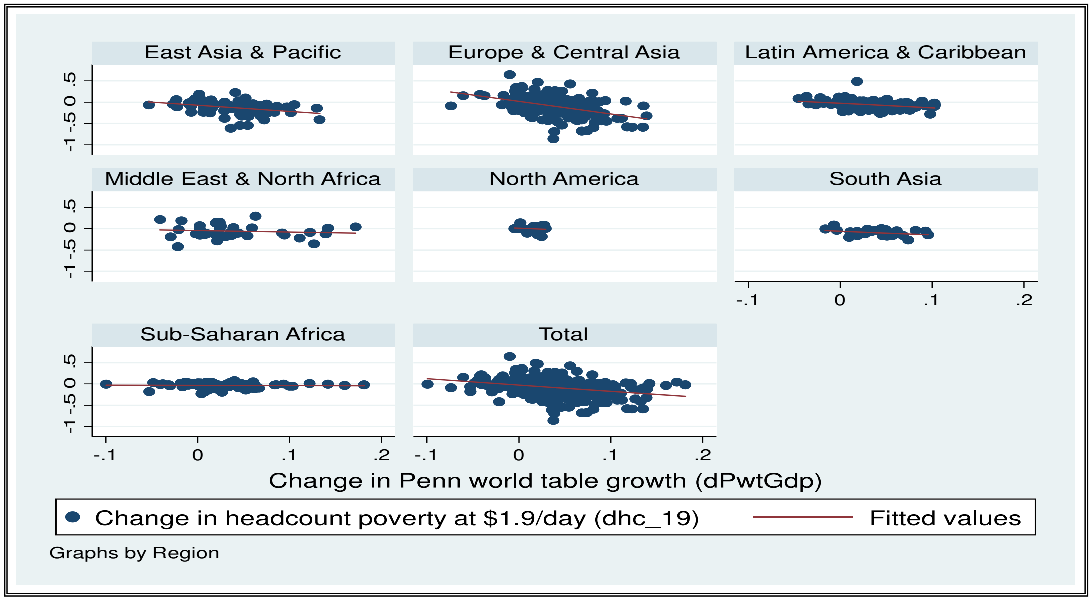
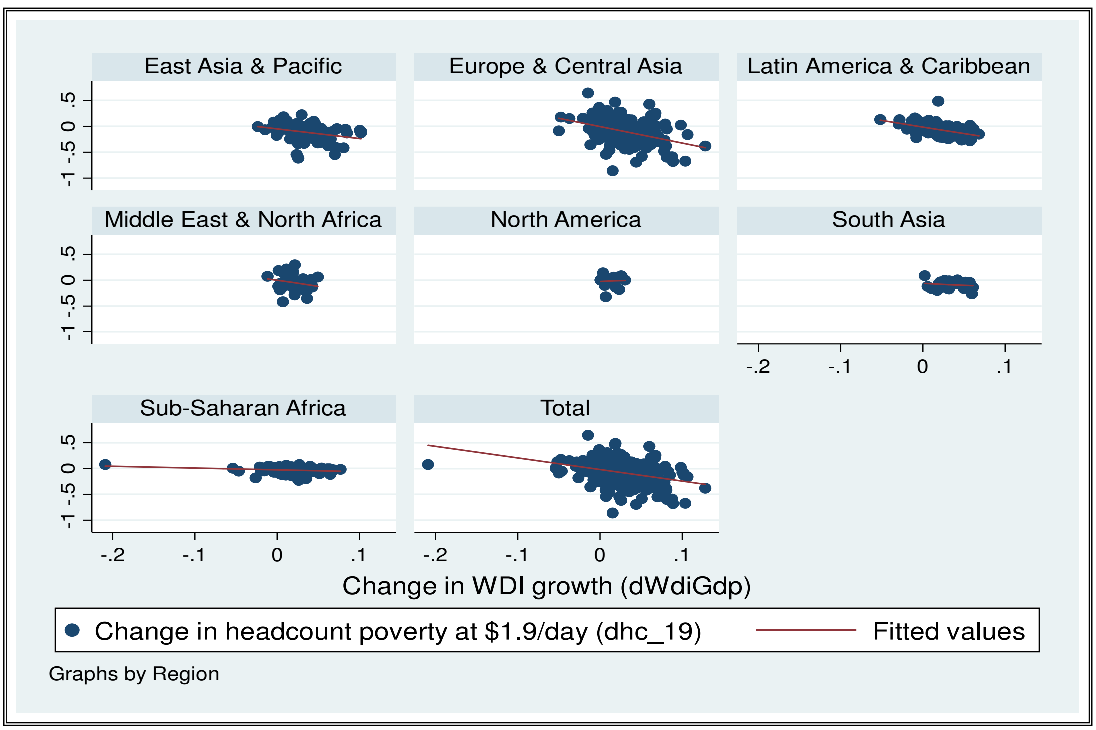
APPENDICES

Appendix One: Appendices to Chapter Two

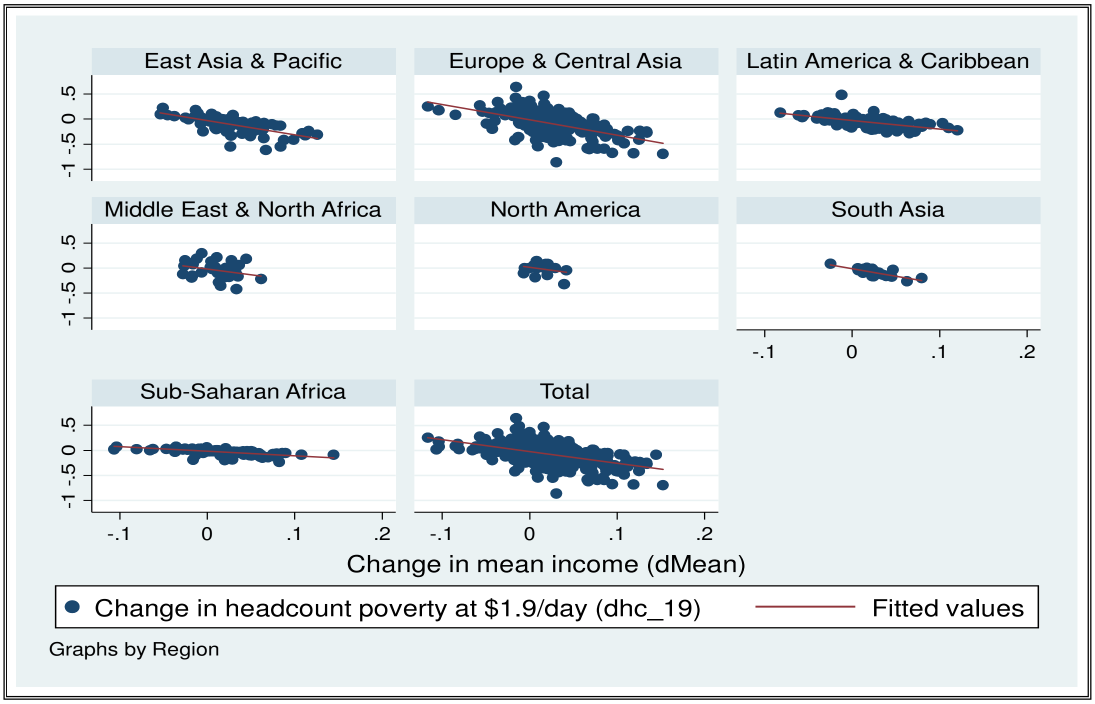
Appendix 1A1: Correlation Between the PWT Growth Rate and Rate of Poverty Headcount Measure



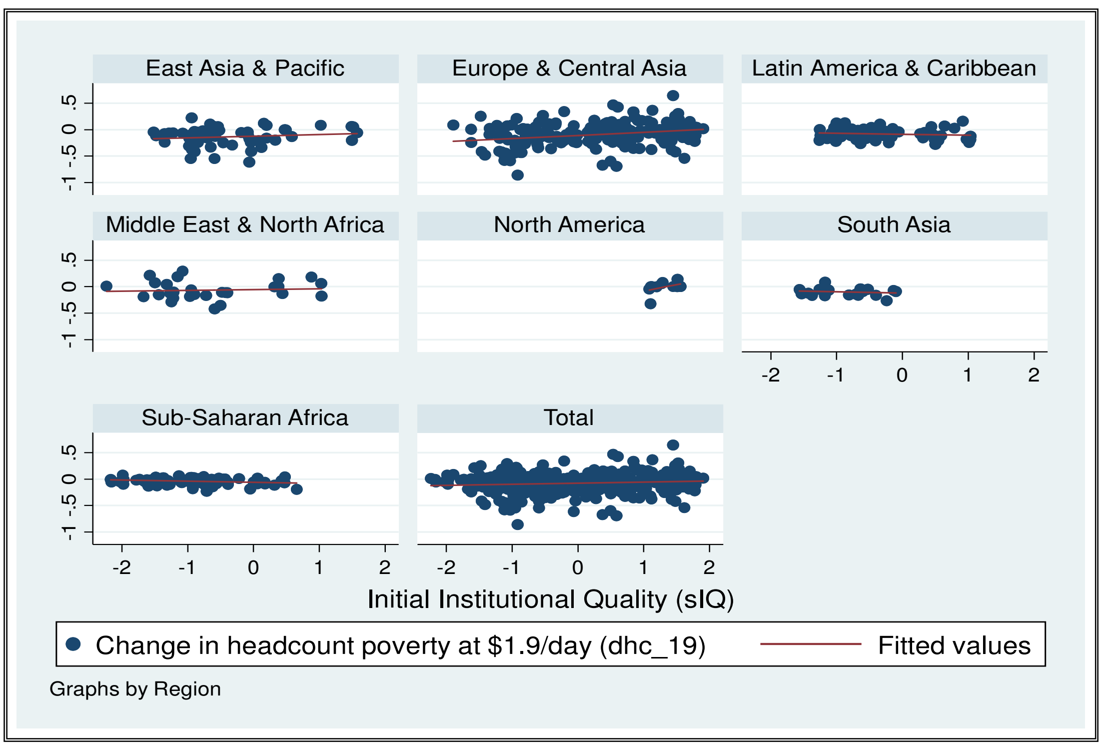
Appendix 1A2: Correlation Between the WDI Growth Rate and Rate of Poverty Headcount Measure



Appendix 1A3: Correlation Between Mean Income Growth Rate and Rate of Poverty Headcount Measure



Appendix 1A4: Correlation Between the Level of Institutional Quality and Rate of Poverty Headcount Measure



Appendix 1B1: OLS Regression Results at $1.90 and $3.20/day Poverty Headcount Measures for Selected Regression Models with Endogeneity

Dependent Variable: Δlog $1.90/day (Δloghc_19$_{it}$) and Δlog $3.20/day (Δloghc_32$_{it}$) poverty headcount measures					
	Global Samples				
	PWT Growth dataset			PovcalNet Growth dataset	
	Δloghc_19$_{it}$		Δloghc_32$_{it}$	Δloghc_19$_{it}$	Δloghc_32$_{it}$
Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5
Growth (in annualised log change)	-1.994***		-1.315***	-2.925***	-2.293***
	(0.277)		(0.195)	(0.258)	(0.198)
Initial Institutional Quality (sIQ)	0.0589***	0.0456***	0.0335***	0.0412***	0.0223***
	(0.0116)	(0.0125)	(0.00839)	(0.0102)	(0.00718)
Growth*sIQ	-1.085***	-0.786***	-0.645***	-0.406	-0.402*
	(0.227)	(0.283)	(0.163)	(0.250)	(0.219)
Growth x regional dummy variables					
East Asia and Pacific (EAP)		-2.827***			
		(0.391)			
Europe & Central Asia (ECA)		-2.429***			
		(0.391)			
Latin America & Caribbean (LAC)		-1.086***			
		(0.265)			
Middle East & North Africa (MENA)		-1.354***			
		(0.511)			
North America (NA)		0.523			
		(0.954)			
South Asia (SA)		-1.799***			
		(0.414)			
Sub-Saharan Africa (SSA)		-0.940**			
		(0.413)			
Change in income inequality (dGini)	2.349***	2.624***	1.991***	3.361***	2.647***
	(0.444)	(0.462)	(0.327)	(0.398)	(0.298)
Initial education index (lnsEduindx)	-0.0909***	-0.0544**	-0.0818***	-0.0931***	-0.0802***
	(0.0217)	(0.0228)	(0.0154)	(0.0177)	(0.0133)
Constant	-0.0563***	-0.0392**	-0.0559***	-0.0399***	-0.0377***
	(0.0158)	(0.0161)	(0.0119)	(0.0124)	(0.00888)
Observations	471	471	499	508	537
R-squared	0.228	0.271	0.203	0.423	0.389

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: *PWT = Penn World Tables; and Growth = Δlog (Per capita GDP/Mean Income)*

Appendix 1B2: IV-2SLS and Consistent Pooled OLS Regression Results at $3.20/day Poverty Headcount Measure

Dependent Variable: Δlog $3.20/day ($\Delta loghc_32_{it}$) poverty headcount measure									
	Global Sample						Sub-Saharan African Sample		
	PWT Growth Dataset		WDI Growth Dataset		PovcalNet Growth Dataset		PWT	WDI	PovcalNet
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Explanatory variables	IV-2SLS	OLS	OLS	OLS	IV-2SLS	OLS	OLS	OLS	OLS
Growth (in annualised log change)	-2.048***		-2.099***		-2.747***		0.160	0.0652	-0.426**
	(0.338)		(0.290)		(0.258)		(0.244)	(0.305)	(0.196)
Institutional Quality (IQ)	0.042**	0.0232***	0.0185*	0.0101	0.028	0.0149**	-0.0171**	-0.0177***	-0.0129**
	(0.020)	(0.00880)	(0.0108)	(0.0120)	(0.019)	(0.00725)	(0.00708)	(0.00550)	(0.00591)
Growth*sIQ	-1.615***	-0.411**	-0.597*	-0.400	-1.402*	-0.240	0.0830	0.0950	0.138
	(0.338)	(0.208)	(0.328)	(0.395)	(0.440)	(0.223)	(0.153)	(0.184)	(0.161)
Growth x regional dummy variables									
East Asia and Pacific (EAP)		-1.724***		-2.244***		-2.407***			
		(0.272)		(0.413)		(0.276)			
Europe & Central Asia (ECA)		-1.617***		-2.325***		-2.624***			
		(0.271)		(0.366)		(0.230)			
Latin America & Caribbean (LAC)		-0.802***		-1.833***		-1.721***			
		(0.205)		(0.335)		(0.195)			
Middle East & North Africa (MENA)		-0.891***		-2.532**		-2.301*			
		(0.340)		(1.005)		(1.327)			
North America (NA)		1.182		1.260		-1.474			
		(0.885)		(1.132)		(0.928)			
South Asia (SA)		-1.119**		-1.433***		-3.366***			
		(0.465)		(0.466)		(0.926)			
Sub-Saharan Africa (SSA)		-0.482		-0.894*		-0.984***			
		(0.298)		(0.470)		(0.231)			
Change in inequality (dGini)	2.109***	2.114***	2.081***	2.088***	2.712***	2.727***	0.632**	0.617*	0.666**
	(0.364)	(0.345)	(0.329)	(0.346)	(0.330)	(0.286)	(0.309)	(0.324)	(0.318)
Initial education index	-0.054	-0.0534***	-0.0750***	-0.0459***	-0.061*	-0.0485***	-0.0128	-0.0111	-0.0231**
	(0.040)	(0.0155)	(0.0146)	(0.0174)	(0.033)	(0.0128)	(0.0104)	(0.0106)	(0.00909)
Constant	-0.029	-0.0428***	-0.0446***	-0.0337***	-0.022	-0.0241***	-0.0491***	-0.0446***	-0.0413***
	(0.025)	(0.0120)	(0.0110)	(0.0118)	(0.017)	(0.00854)	(0.0156)	(0.0131)	(0.0142)
Observations	491	499	537	537	527	537	89	91	91
R-squared	0.123	0.232	0.204	0.219	0.328	0.421	0.272	0.252	0.523

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 1C: The Robustness Bourguignon Model OLS Regression Results at $3.20/day Poverty Headcount Measure

Dependent Variable: Δlog $3.20/day (Δloghc_32$_{it}$) poverty headcount measure									
	Global Sample						Sub-Saharan African Sample		
	PWT Growth Dataset		WDI Growth Dataset		PovcalNet Growth Dataset		PWT	WDI	PovcalNet
Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Growth (in annualised log change)	3.804**		4.321*		1.475***		-0.742	0.372	0.187
	(1.671)		(2.485)		(0.465)		(0.470)	(0.949)	(0.148)
Institutional Quality (sIQ)	0.0237**	0.0189*	0.0170	0.0154	0.0177**	0.0180***	-0.00818	-0.0149*	-0.00357*
	(0.0105)	(0.0104)	(0.0107)	(0.0109)	(0.00685)	(0.00683)	(0.00691)	(0.00749)	(0.00206)
Growth*sIQ	-0.215	-0.132	-0.0432	-0.206	0.356	0.279	-0.113	-0.0124	0.111*
	(0.257)	(0.236)	(0.420)	(0.425)	(0.229)	(0.239)	(0.137)	(0.220)	(0.0628)
Growth x regional dummy variables									
East Asia and Pacific		2.576		2.914		0.883			
		(2.005)		(3.199)		(0.955)			
Europe & Central Asia		2.887		3.194		1.022			
		(2.121)		(3.333)		(1.052)			
Latin America & Caribbean		3.236*		2.461		1.133			
		(1.847)		(3.049)		(0.782)			
Middle East & North Africa		3.540*		3.069		1.392			
		(2.039)		(3.287)		(1.273)			
North America		5.280**		6.514**		2.498*			
		(2.235)		(3.240)		(1.389)			
South Asia		3.087		3.705		0.143			
		(1.993)		(3.130)		(1.056)			
Sub-Saharan Africa		3.378*		3.752		1.332*			
		(1.792)		(2.897)		(0.724)			
Change in inequality (dGini)	-8.568***	-8.588***	-5.535***	-5.784***	-1.764	-1.872	-4.120**	-3.219*	0.543
	(2.169)	(2.169)	(1.991)	(2.011)	(1.143)	(1.204)	(1.634)	(1.686)	(0.341)
Initial inequality (lnsGini)	0.0202	0.0154	-0.0115	-0.0128	0.00651	0.00379	0.0348	0.0145	0.0147**
	(0.0314)	(0.0315)	(0.0332)	(0.0322)	(0.0214)	(0.0212)	(0.0227)	(0.0324)	(0.00659)
Growth*lnsGini	0.773	0.431	2.521**	3.187**	2.375***	2.069**	0.0110	0.651	0.736***
	(0.670)	(0.957)	(1.142)	(1.480)	(0.492)	(0.872)	(0.276)	(0.621)	(0.193)
dGini*lnsGini	-1.678	-1.616	-2.845*	-3.367*	-3.038**	-3.150**	-0.514	-0.715	0.128
	(1.563)	(1.615)	(1.672)	(1.732)	(1.243)	(1.317)	(1.228)	(1.278)	(0.383)
Level of development (lnZY32)	-0.00396	-0.00224	0.00404	0.00669	0.00794	0.0106	0.0118***	0.00583	0.00877***
	(0.00992)	(0.00954)	(0.0126)	(0.0129)	(0.00849)	(0.00841)	(0.00434)	(0.00543)	(0.00288)
Growth*lnZY32	0.517***	0.461**	0.495*	0.259	0.977***	0.889***	-0.0967	-0.0331	0.662***
	(0.171)	(0.188)	(0.281)	(0.335)	(0.215)	(0.295)	(0.0661)	(0.133)	(0.0667)
dGini*lnZY32	-1.162***	-1.172***	-0.713***	-0.676***	-1.652***	-1.603***	-0.638***	-0.543***	-1.344***
	(0.247)	(0.255)	(0.244)	(0.251)	(0.303)	(0.300)	(0.132)	(0.148)	(0.0709)
Initial education index	-0.0410*	-0.0294	-0.0315	-0.0190	-0.00925	-0.00671	0.00467	0.00432	0.00574*
	(0.0219)	(0.0216)	(0.0218)	(0.0249)	(0.0172)	(0.0161)	(0.00846)	(0.00995)	(0.00315)
Constant	-0.0502	-0.0355	-0.00905	0.0150	0.0157	0.0170	0.0881**	0.0196	0.0156**
	(0.0940)	(0.0884)	(0.104)	(0.107)	(0.0263)	(0.0247)	(0.0371)	(0.0469)	(0.00666)
Observations	499	499	537	537	537	537	89	91	91
R-squared	0.260	0.273	0.242	0.252	0.472	0.477	0.522	0.457	0.945

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 1D: Regression Results for Impact of Interaction Terms on Poverty for Different Percentile Levels of IQ at $1.90 and $3.20/day Poverty Headcount Measures

Appendix 1D1: Regional Dummy Model Results for PWT Growth Regressions

Percentile	**Percentile Values**	**Analysis for PWT Per Capita Growth Rate and IQ at $1.90/day poverty headcount (IV Results)**	**Analysis for PWT Per Capita Growth Rate and IQ at $3.20/day poverty headcount (OLS Results)**
East Asia & Pacific	IQ Percentile Value	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -3.651 - 1.992\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -1.724 - 0.411\ (IQ)$
10%	-1.075254	**-1.509**	**-1.282**
25%	-0.9368611	**-1.785**	**-1.339**
50%	-0.6769241	**-2.303**	**-1.446**
75%	-0.0362265	**-3.579**	**-1.709**
90%	0.4899846	**-4.627**	**-1.925**
99%	1.574817	**-6.788**	**-2.371**
Europe & Central Asia		$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -2.838 - 1.992(IQ)$	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -1.617 - 0.411\ (IQ)$
10%	-1.031231	**-0.784**	**-1.193**
25%	-0.4347497	**-1.972**	**-1.438**
50%	0.5879158	**-4.009**	**-1.859**
75%	1.34825	**-5.524**	**-2.171**
90%	1.628227	**-6.081**	**-2.286**
99%	1.800444	**-6.424**	**-2.357**
Latin America & Caribbean		$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -1.66 - 1.992(IQ)$	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -0.802 - 0.411\ (IQ)$
10%	-1.021653	**0.375**	**-0.382**
25%	-0.9320051	**0.197**	**-0.419**
50%	-0.5517685	**-0.561**	**-0.575**
75%	-0.2080216	**-1.246**	**-0.717**
90%	0.5435901	**-2.743**	**-1.025**
99%	1.035762	**-3.723**	**-1.228**
Middle East & North Africa		$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -2.764 - 1.992\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -0.891 - 0.411\ (IQ)$
10%	-1.536726	**0.297**	**-0.259**
25%	-1.248158	**-0.278**	**-0.378**
50%	-0.8096535	**-1.151**	**-0.558**
75%	0.3770211	**-3.515**	**-1.046**
90%	0.9549814	**-4.666**	**-1.283**
99%	1.04814	**-4.852**	**-1.322**
South Asia		$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -2.723 - 1.992\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -1.119 - 0.411\ (IQ)$
10%	-1.532053	**0.329**	**-0.489**
25%	-1.259165	**-0.215**	**-0.601**
50%	-0.7602609	**-1.209**	**-0.807**
75%	-0.6034059	**-1.521**	**-0.871**
90%	-0.2399033	**-2.245**	**-1.020**
99%	-0.0996669	**-2.524**	**-1.078**
Sub-Saharan Africa		$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -2.478 - 1.992\ (IQ)$	$\frac{\partial(Pov.rt)}{\partial(PWTgrt)} = -0.482 - 0.411\ (IQ)$
10%	-1.638567	**0.786**	**0.191**
25%	-1.404337	**0.319**	**0.095**
50%	-0.9460943	**-0.593**	**-0.093**
75%	-0.6267927	**-1.229**	**-0.224**
90%	0.0031929	**-2.484**	**-0.483**
99%	0.657271	**-3.787**	**-0.752**

Appendix 1D2: Regional Dummy Model Results for PovcalNet Mean Income Growth Regressions

Percentiles	Percentile Values	*Analysis for Mean Income Growth Rate and PSV at $1.90/day* poverty headcount (OLS Results)	*Analysis for Mean Income Growth Rate and PSV at $3.20/day* poverty headcount (OLS Results)
East Asia & Pacific	IQ Value	$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 3.553 - 0.458(PSV)$	$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 2.347 - 0.429(PSV)$
10%	-1.38893	**-2.917**	**-1.751**
25%	-0.772879	**-3.199**	**-2.015**
50%	0.0517916	**-3.577**	**-2.369**
75%	0.47325	**-3.770**	**-2.550**
90%	0.9556448	**-3.991**	**-2.757**
99%	1.348995	**-4.171**	**-2.926**
Europe & Central Asia		$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 3.313 - 0.458(PSV)$	$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 2.577 - 0.429(PSV)$
10%	-0.684167	**-3.000**	**-2.283**
25%	0.0211045	**-3.323**	**-2.586**
50%	0.6038897	**-3.590**	**-2.836**
75%	1.040587	**-3.790**	**-3.023**
90%	1.332353	**-3.923**	**-3.149**
99%	1.63953	**-4.064**	**-3.280**
Latin America & Caribbean		$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 1.960 - 0.458(PSV)$	$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 1.758 - 0.429(PSV)$
10%	-0.988731	**-1.507**	**-1.334**
25%	-0.726463	**-1.627**	**-1.446**
50%	-0.305605	**-1.820**	**-1.627**
75%	0.0636812	**-1.989**	**-1.785**
90%	0.6141229	**-2.241**	**-2.021**
99%	1.071824	**-2.451**	**-2.218**
Middle East & North Africa		$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 2.815 - 0.458(PSV)$	$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 2.331 - 0.429(PSV)$
10%	-1.648318	**-2.060**	**-1.624**
25%	-1.341152	**-2.201**	**-1.756**
50%	-0.970500	**-2.371**	**-1.915**
75%	-0.063976	**-2.786**	**-2.304**
90%	1.064507	**-3.303**	**-2.788**
99%	1.248981	**-3.387**	**-2.867**
South Asia		$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 3.768 - 0.458(PSV)$	$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 3.394 - 0.429(PSV)$
10%	-2.429894	**-2.655**	**-2.352**
25%	-1.753717	**-2.965**	**-2.642**
50%	-1.302847	**-3.171**	**-2.835**
75%	-0.724509	**-3.436**	**-3.083**
90%	0.5686632	**-4.028**	**-3.638**
99%	1.075047	**-4.260**	**-3.855**
Sub-Saharan Africa		$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 1.406 - 0.458(PSV)$	$\frac{\partial(Pov.rt)}{\partial(Meanincgrt)} - 0.838 - 0.429(PSV)$
10%	-1.692821	**-0.631**	**-0.112**
25%	-1.244406	**-0.836**	**-0.304**
50%	-0.225484	**-1.303**	**-0.741**
75%	0.1233549	**-1.462**	**-0.891**
90%	0.6756262	**-1.715**	**-1.128**
99%	1.150208	**-1.933**	**-1.331**

Appendix 1D3: Regional Dummy Model OLS Results for WDI Growth Regressions

Percentiles	IQ Percentile Value	***Analysis for WDI Growth Rate and IQ at $1.90/day poverty headcount***	**PSV Percentile Value**	***Analysis for Mean Income Growth Rate and PSV at $3.20/day poverty headcount***
East Asia & Pacific		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -3.508 - 0.982(IQ)$		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.151 - 0.549(PSV)$
10%	-1.075254	**-2.452**	-1.38893	**-1.561**
25%	-0.9368611	**-2.588**	-0.7728798	**-1.637**
50%	-0.6769241	**-2.843**	0.0517916	**-1.779**
75%	-0.0362265	**-3.472**	0.47325	**-2.131**
90%	0.4899846	**-3.989**	0.9556448	**-2.420**
99%	1.574817	**-5.054**	1.348995	**-3.016**
Europe & Central Asia		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -3.083 - 0.982(IQ)$		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.260 - 0.549(PSV)$
10%	-1.031231	**-2.070**	-0.6841678	**-1.694**
25%	-0.4347497	**-2.656**	0.0211045	**-2.021**
50%	0.5879158	**-3.660**	0.6038897	**-2.583**
75%	1.34825	**-4.407**	1.040587	**-3.000**
90%	1.628227	**-4.682**	1.332353	**-3.154**
99%	1.800444	**-4.851**	1.63953	**-3.248**
Latin Ameri & Carib.		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.332 - 0.982(IQ)$		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -1.911 - 0.549(PSV)$
10%	-1.021653	**-1.329**	-0.9887312	**-1.350**
25%	-0.9320051	**-1.417**	-0.7264634	**-1.399**
50%	-0.5517685	**-1.790**	-0.3056052	**-1.608**
75%	-0.2080216	**-2.128**	0.0636812	**-1.797**
90%	0.5435901	**-2.866**	0.6141229	**-2.209**
99%	1.035762	**-3.349**	1.071824	**-2.480**
Mid. East& North Afr.		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.262 - 0.982(IQ)$		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.749 - 0.549(PSV)$
10%	-1.536726	**-0.753**	-1.648318	**-1.905**
25%	-1.248158	**-1.036**	-1.341152	**-2.064**
50%	-0.8096535	**-1.467**	-0.9705001	**-2.305**
75%	0.3770211	**-2.632**	-0.0639764	**-2.956**
90%	0.9549814	**-3.200**	1.064507	**-3.273**
99%	1.04814	**-3.291**	1.248981	**-3.324**
South Asia		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -2.489 - 0.982(IQ)$		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -1.731 - 0.549(PSV)$
10%	-1.532053	**-0.985**	-2.429894	**-0.890**
25%	-1.259165	**-1.252**	-1.753717	**-1.040**
50%	-0.7602609	**-1.742**	-1.302847	**-1.314**
75%	-0.6034059	**-1.896**	-0.7245092	**-1.400**
90%	-0.2399033	**-2.253**	0.5686632	**-1.599**
99%	-0.0996669	**-2.391**	1.075047	**-1.676**
Sub-Saharan Africa		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -1.470 - 0.982(IQ)$		$\frac{\partial(Pov.rt)}{\partial(WDIgrt)} = -0.847 - 0.549(PSV)$
10%	-1.638567	**0.139**	-1.692821	**0.053**
25%	-1.404337	**-0.091**	-1.244406	**-0.076**
50%	-0.9460943	**-0.541**	-0.2254847	**-0.328**
75%	-0.6267927	**-0.854**	0.1233549	**-0.503**
90%	0.0031929	**-1.473**	0.6756262	**-0.849**
99%	0.657271	**-2.115**	1.150208	**-1.208**

Appendix 1E1: Test for Endogeneity and Instrument Validity for non-Regional Dummy Robustness Bourguignon Models with IQ Terms at the $1.90/day Poverty Headcount Measure in Global Sample

	Global PWT Per capita Growth (dPwtGdp)			Global WDI Per capita Growth (dWdiGdp)			Global Mean Income Growth (dMean)		
*Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)*	Ho: variables are exogenous Durbin (score) chi2(3) = **(p =0.8460)** Wu-Hausman F(3,421) =**(p = 0.8523)**			Ho: variables are exogenous Durbin (score) chi2(3) = **(p =0.2598)** Wu-Hausman F(3,148) = **(p = 0.2953)**			Ho: variables are exogenous Durbin (score) chi2(3) =**(p=0.5470)** Wu-Hausman F(3,148) =**(p=0.5832)**		
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.1240**			**Prob>chi2 = *0.3662***			**Prob>chi2 = 0.7068**		
First Stage Regressions									
	IQ	**dPwtgdp**	**IQ*dPwtgdp**	**IQ**	**dWdigdp**	**IQ*dWdigdp**	**IQ**	**dMean**	**IQ*dMean**
Instrumental variables									
Absolute latitude (Lat_abs)	0.6646*** (0.2271)			0.9906* (0.5286)			0.8589* (0.4540)		
Annualized log change in commodity exports price index (dx_gdp)		0.2101*** (0.0419)							
(Lat_abs)*(dx_gdp)			7.1190*** (1.0164)						
Lagged value of WDI Per capita Growth (dWdiGdp_1)					0.0689*** (0.0127)				
(Lat_abs)*(dWdiGdp_1)						1.8383*** (0.3690)			
Lagged value of Mean Income Growth (dMean_1)								0.0362 (0.0309)	
(Lat_abs)*(dMean_1)									0.9517*** (0.3407)
Constant	-6.4476*** (0.4911)	0.0242*** (0.0036)	-0.1201** (0.0332)	-3.580*** (0.6268)	0.0180*** (0.0025)	-0.0681*** (0.0225)	-0.949*** (0.3013)	0.0176*** (0.0040)	-0.0360*** (0.0123)
Observations	436	436	436	163	163	163	163	163	163
R-squared	0.6855	0.9883	0.5256	0.6282	0.9925	0.6489	0.6151	0.9628	0.6372
Test for Instrument Validity									
t-value for instrument	2.93	5.01	7.00	1.87	5.41	4.98	1.89	1.17	2.79
F-value	5.04372	22.2146	18.7553	2.90425	26.0149	12.6482	3.1046	6.05837	5.85869
Prob > F	0.0019	0.0000	0.0000	0.0368	0.0000	0.0000	0.0284	0.0006	0.0008
Partial R-Square	0.0345	0.1358	0.1172	0.0546	0.3407	0.2008	0.0581	0.1074	0.1043
Shea's Partial R-Square	0.0363	0.0305	0.0300	0.0023	0.0021	0.0013	0.0181	0.0568	0.0260

Notes: *dPwtgdp = Annualised Log change in per capita PWT GDP growth; dPwtgdp = Annualised Log change in per capita WDI GDP growth; and dMean = Annualised Log change in per capita Mean Income growth*

Appendix 1E2: Test for Endogeneity and Instrument Validity for Regional Dummy Robustness Bourguignon Models with IQ Terms at the $1.90/day Poverty Headcount Measure in Global Sample

	Global PWT Growth (dPwtGdp)		Global WDI Growth (dWdiGdp)		Global Mean Income Growth (dMean)	
*Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)*	Ho: variables are exogenous Durbin (score) chi2(3) = **(p =0.6738)** Wu-Hausman F(2,416) =**(p = 0.6859)**		Ho: variables are exogenous Durbin (score) chi2(2) = **(p =0.5111)** Wu-Hausman F(2,421) = **(p = 0.5264)**		Ho: variables are exogenous Durbin (score) chi2(2) =**(p=0.9028)** Wu-Hausman F(2,143) =**(p=0.9142)**	
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.0967**		**Prob>chi2 = *0.3445***		**Prob>chi2 = 0.1160**	
First Stage Regressions						
	IQ	**IQ*dPwtgdp**	**IQ**	**IQ*dWdigdp**	**IQ**	**IQ*dMean**
Instrumental variables						
Absolute latitude (Lat_abs)	1.0294*** (0.2608)		-29.6819*** (6.6454)		1.3842*** (0.3793)	
(Lat_abs)*(dx_gdp)		0.3004 (0.5489)				
[lnx_gdp = Natural log. of commodity export price index]				-0.8845*** (0.2409)		
(Lat_abs)*(dMean_1)						-0.0780 (0.1683)
Constant	-5.9468***	0.0230	-4.7311	0.0328***	-0.4185	-0.0019
	(0.5674)	(0.0317)	(0.3776)	(0.0137)	(0.3064)	(0.0105)
Observations	463	463	441	441	163	163
R-squared	0.7010	0.6918	0.7864	0.7163	0.6828	0.7867
Test for Instrument Validity						
t-value for instrument	3.95	0.55	-4.47	3.72	3.65	-0.46
F-value	11.4748	4.37449	19.2431	7.99403	7.11322	6.53824
Prob > F	0.0000	0.0132	0.0000	0.0004	0.0011	0.0019
Partial R-Square	0.0520	0.0205	0.0834	0.0364	0.0893	0.0827
Shea's Partial R-Square	0.0067	0.0026	0.0211	0.0092	0.0004	0.0004

Notes: *dPwtgdp = Annualised Log change in per capita PWT GDP growth; dPwtgdp = Annualised Log change in per capita WDI GDP growth; dMean = Annualised Log change in per capita Mean Income growth; SSA = Sub-Saharan Africa; & IQ = Institutional quality*

Appendix 1E3: Test for Endogeneity and Instrument Validity for Robustness Bourguignon Models with IQ Terms at $1.90/day Poverty Headcount Measure in Sub-Saharan African Sample

	SSA PWT Per capita Growth (dPwtGdp)			SSA WDI Per capita Growth (dWdiGdp)			SSA Mean Income Growth (dMean)	
*Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)*	Ho: variables are exogenous Durbin (score) chi2(3) = **(p =0.2471)** Wu-Hausman F(3,71) =**(p = 0.3176)**			Ho: variables are exogenous Durbin (score) chi2(3) = **(p =0.6611)** Wu-Hausman F(3,42) = **(p = 0.7520)**			Ho: variables are exogenous Durbin (score) chi2(3) =**(p=0.2460)** Wu-Hausman F(2,76) =**(p=0.3003)**	
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.2555**			**Prob>chi2 = *0.5477***			**Prob>chi2 = 0.4822**	
First Stage Regressions								
	IQ	**dPwtgdp**	**IQ*dPwtgdp**	**IQ**	**dWdigdp**	**IQ*dWdigdp**	**IQ**	**IQ*dMean**
Instrumental variables								
Absolute latitude (Lat_abs)	2.0601** (0.9452)			2.2631* (1.1986)			1.3195 (1.0005)	
Annualized log change in commodity export prices (dx_gdp)		-0.03028** (0.1258)						
(Lat_abs)*(dx_gdp)			8.3684 (6.9149)					
Lagged value of WDI Per capita Growth (dWdiGdp_1)					0.0494*** (.0178)			
(Lat_abs)*(dWdiGdp_1)						2.4367** (1.0914)		
(Lat_abs)*(dMean)								2.2871*** (0.8318)
Constant	-1.8698* (0.9498)	0.0279*** (0.0055)	-0.0062** (0.0468)	-0.8279 (1.0093)	0.0208*** (0.0033)	-0.0394 (0.0282)	-0.5501 (0.4769)	0.0020 (0.0151)
Observations R-squared	86 0.4141	86 0.9954	86 0.8681	57 0.5534	57 0.9955	57 0.8150	90 0.4400	90 0.8179
Test for Instrument Validity								
t-value for instrument *F-value*	2.18 1.82234	-2.41 2.54485	1.21 1.12989	1.89 2.25946	2.78 3.9633	2.23 3.15837	1.32 3.16228	2.75 4.99464
Prob > F	0.1505	0.0625	0.3426	0.0944	0.0137	0.0337	0.0478	.0091
Partial R-Square *Shea's Partial R-Square*	0.0688 0.0037	0.0935 0.0028	0.0438 0.0014	0.1309 0.1162	0.2090 0.1148	0.1739 0.1028	0.0750 0.0261	0.1135 0.0394

Notes: *dPwtgdp = Annualised Log change in per capita PWT GDP growth; dPwtgdp = Annualised Log change in per capita WDI GDP growth; dMean = Annualised Log change in per capita Mean Income growth; SSA = Sub-Saharan Africa; & IQ = Institutional quality*

Appendix Two: Appendices to Chapter Three

Appendix 2A: Regression Results for Sectoral Value-added Growth at $3.20/day Poverty Headcount Measure

Dependent Variable: Δlog $3.20/day poverty headcount measure, Δloghc_32$_{it}$						
	Models without IQ		**Models with IQ**		**SSA Models with/without IQ**	
Explanatory vvariables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Agriculture value-added growth	-1.344		-1.549		-0.0432	-0.136
	(0.837)		(1.435)		(0.365)	(0.787)
Industry value-added growth	-0.325		-0.941		0.233	0.0767
	(0.399)		(0.661)		(0.396)	(0.467)
Services value-added growth	-0.824*		-0.939		-0.393	-0.310
	(0.460)		(0.655)		(0.311)	(0.683)
Institutional Quality (IQ)			0.0292	0.0309		0.00982
			(0.0193)	(0.0230)		(0.0170)
(Agriculture value-added growth) * IQ			-0.596	-0.180		0.0354
			(1.104)	(1.498)		(0.634)
(Industry value-added growth) * IQ			-1.103*	-0.893		0.152
			(0.602)	(0.647)		(0.518)
(Services value-added growth) * IQ			-0.730	-0.912		-0.308
			(0.531)	(0.631)		(0.477)
Agric value-added growth*_regional dummy variable_						
East Asia and Pacific (EAP)		2.363		-5.694		
		(3.595)		(6.460)		
Europe & Central Asia (ECA)		-16.03		-8.779		
		(16.73)		(5.999)		
Latin America & Caribbean (LAC)		-3.510		1.972		
		(2.923)		(4.240)		
Middle East & North Africa (MENA)		-10.88**		-6.006*		
		(4.638)		(3.593)		
South Asia (SA)		2.109		3.786*		
		(1.666)		(2.113)		
Sub-Saharan Africa (SSA)		-0.788		-1.612		
		(0.596)		(1.677)		
Indust value-added growth*_regional dummy variab._						
East Asia and Pacific (EAP)		1.432		1.041		
		(1.123)		(1.930)		
Europe & Central Asia (ECA)		-1.355		8.130***		
		(6.003)		(1.065)		
Latin America & Caribbean (LAC)		0.104		-0.895		
		(0.923)		(1.562)		
Middle East & North Africa (MENA)		2.276		0.236		
		(1.908)		(2.515)		
South Asia (SA)		2.923**		2.795*		
		(1.212)		(1.530)		
Sub-Saharan Africa (SSA)		-0.260		-0.390		
		(0.641)		(0.709)		
Services value-added growth*_regional dummy varia_						
East Asia and Pacific (EAP)		-3.110**		-2.614		
		(1.236)		(1.881)		
Europe & Central Asia (ECA)		-1.065		-8.781***		
		(5.484)		(0.858)		
Latin America & Caribbean (LAC)		-1.027		-1.109		
		(0.743)		(0.898)		
Middle East & North Africa (MENA)		1.146		-0.198		
		(1.132)		(1.268)		
South Asia (SA)		-2.072**		-2.762**		
		(0.988)		(1.237)		
Sub-Saharan Africa (SSA)		-0.732*		-0.949		
		(0.411)		(0.810)		
Population growth	3.387***	2.604***	2.714***	2.224*	0.954**	1.021
	(1.033)	(0.975)	(0.997)	(1.267)	(0.415)	(0.620)
Change in inequality (dGini)	1.305***	1.365***	1.298***	1.585***	-0.0188	-0.0311
	(0.309)	(0.301)	(0.438)	(0.447)	(0.163)	(0.180)
Initial Gini (lnsGini)	-0.00983	0.0308	0.00335	-0.000609	0.0123	-0.0133
	(0.0213)	(0.0344)	(0.0300)	(0.0459)	(0.0221)	(0.0295)
Initial life expectancy	-0.128***	-0.121***	-0.162***	-0.147**	-0.0276	-0.0662
	(0.0412)	(0.0428)	(0.0417)	(0.0620)	(0.0287)	(0.0410)
Constant	0.452**	0.468***	0.614***	0.560**	0.0915	0.223
	(0.190)	(0.178)	(0.185)	(0.251)	(0.109)	(0.148)
Observations	232	232	162	162	56	42
R-squared	0.319	0.432	0.370	0.454	0.207	0.292

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Appendix 2B: Regression Results for Sectoral Labour Productivity Growth at $3.20/day Poverty Headcount Measure

Dependent Variable: Δlog $3.20/day poverty headcount measure, Δloghc_32$_{it}$						
	Models without IQ		**Models with IQ**		**SSA Models with/without IQ**	
Explanatory vvariables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Agriculture Lab. Productivity growth	-1.200		-0.699		-0.0784	0.503
	(1.067)		(1.956)		(0.484)	(0.918)
Industry Lab. Productivity growth	0.0661		-0.277		0.255	-0.320
	(0.464)		(0.856)		(0.417)	(0.506)
Services Lab. Productivity growth	-1.405***		-0.965		-0.403	0.285
	(0.392)		(0.623)		(0.388)	(0.505)
Agriculture Lab. force expansion	-1.417	-1.572	-2.357	-1.165	-0.470	-0.434
	(1.891)	(1.704)	(2.003)	(1.940)	(0.994)	(1.104)
Industry Lab. force expansion	-0.964	-0.308	-1.266	-0.635	0.351	-0.0121
	(0.606)	(0.699)	(0.822)	(1.014)	(0.446)	(0.426)
Services Lab. force expansion	-0.817	-1.153	-1.366**	-1.928**	-0.603	-0.377
	(0.690)	(0.796)	(0.669)	(0.801)	(0.411)	(0.351)
Institutional Quality (IQ)			-0.000528	-0.00659		-0.00909
			(0.0128)	(0.0135)		(0.00874)
(Agriculture Lab. Product. growth) * IQ			-0.748	-0.0711		0.481
			(1.524)	(1.635)		(0.716)
(Industry Lab. Product. growth) * IQ			0.394	0.748		-0.0173
			(0.729)	(0.804)		(0.574)
(Services Lab. Product. growth) * IQ			-0.387	-0.450		-0.211
			(0.542)	(0.570)		(0.495)
Agric Lab. Product. growth*regional dummy varia						
East Asia and Pacific (EAP)		-6.004		-9.253		
		(3.818)		(6.679)		
Europe & Central Asia (ECA)		34.87***		12.65		
		(6.258)		(12.22)		
Latin America & Caribbean (LAC)		-5.104*		-2.766		
		(2.696)		(4.193)		
Middle East & North Africa (MENA)		-4.940		-5.050		
		(4.205)		(5.125)		
South Asia (SA)		1.537		3.215		
		(1.467)		(2.344)		
Sub-Saharan Africa (SSA)		-0.674		0.671		
		(0.920)		(1.981)		
Indust Lab. Product. growth*regional dummy vari						
East Asia and Pacific (EAP)		1.471		2.068		
		(0.953)		(1.655)		
Europe & Central Asia (ECA)		-23.97***		-19.89***		
		(4.439)		(4.844)		
Latin America & Caribbean (LAC)		0.583		1.359		
		(0.837)		(1.294)		
Middle East & North Africa (MENA)		3.966**		0.209		
		(1.914)		(3.959)		
South Asia (SA)		0.892		2.405		
		(1.075)		(2.792)		
Sub-Saharan Africa (SSA)		-0.613		-1.223		
		(0.629)		(0.863)		
Services Lab. Product. growth*regional dummy variable						
East Asia and Pacific (EAP)		-2.129**		-1.439		
		(0.930)		(1.679)		
Europe & Central Asia (ECA)		26.53***		26.88***		
		(5.443)		(4.385)		
Latin America & Caribbean (LAC)		-1.541**		-1.031		
		(0.597)		(0.825)		
Middle East & North Africa (MENA)		-1.335		-0.609		
		(1.744)		(2.862)		
South Asia (SA)		-1.701**		-2.423		
		(0.835)		(1.670)		
Sub-Saharan Africa (SSA)		-0.934		-0.429		
		(0.583)		(0.873)		
Change in inequality (dGini)	1.353***	1.430***	1.457***	1.532***	-0.0254	0.223
	(0.323)	(0.367)	(0.451)	(0.528)	(0.182)	(0.203)
Initial Gini (lnsGini)	-0.0238	-0.00872	0.00734	0.00472	0.000489	0.00597
	(0.0224)	(0.0264)	(0.0338)	(0.0366)	(0.0222)	(0.0295)
Initial life expectancy	-0.205***	-0.174***	-0.219***	-0.181***	-0.0495	-0.0393
	(0.0249)	(0.0396)	(0.0288)	(0.0466)	(0.0333)	(0.0371)
Constant	0.809***	0.699***	0.889***	0.740***	0.190	0.146
	(0.112)	(0.176)	(0.121)	(0.199)	(0.129)	(0.135)
Observations	232	232	162	162	56	42
R-squared	0.302	0.374	0.349	0.444	0.185	0.359

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Appendix 2C: Regression Results for Structural Change and Sector Productivity Growth at $3.20/day Poverty Headcount Measure

Dependent Variable: Δlog $1.90/day poverty headcount measure, $\Delta loghc\_19_{it}$	Models without IQ		Models with IQ		SSA Models with/without IQ	
Explanatory vvariables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Structural Change	-0.864***		-0.940*		0.157	0.335
	(0.320)		(0.517)		(0.247)	(0.261)
Sector Productivity growth	-0.702***		-0.568*		-0.0674	0.0195
	(0.172)		(0.316)		(0.193)	(0.157)
Institutional Quality (IQ)			-0.00321	-0.00428		-0.00587
			(0.0115)	(0.0120)		(0.00646)
(Structural Change) * IQ			-0.0812	0.0318		0.264
			(0.598)	(0.625)		(0.234)
(Sector Product. growth) *IQ			-0.111	-0.144		-0.121
			(0.415)	(0.465)		(0.168)
Structural change*regional dummy variable						
East Asia and Pacific (EAP)		-1.433**		-2.645**		
		(0.590)		(1.076)		
Europe & Central Asia (ECA)		-5.540***		-5.570***		
		(1.937)		(1.979)		
Latin America & Caribbean (LAC)		-1.049		-0.979		
		(0.866)		(1.268)		
Middle East & North Africa (MENA)		2.062		2.352		
		(4.774)		(7.281)		
South Asia (SA)		-0.00160		0.745		
		(0.494)		(0.795)		
Sub-Saharan Africa (SSA)		-0.408		-0.0744		
		(0.334)		(0.441)		
Sector Produ growth*regional dummy variable						
East Asia and Pacific (EAP)		-0.545*		-0.272		
		(0.289)		(0.518)		
Europe & Central Asia (ECA)		0.469		0.739		
		(1.101)		(1.110)		
Latin America & Caribbean (LAC)		-0.884*		-0.314		
		(0.462)		(0.636)		
Middle East & North Africa (MENA)		-0.543		-1.945		
		(1.312)		(2.609)		
South Asia (SA)		-0.334		-0.320		
		(0.311)		(0.380)		
Sub-Saharan Africa (SSA)		-0.724**		-0.456		
		(0.313)		(0.317)		
Labour force participation.	-1.005	-0.964	-1.801**	-1.670**	-0.482*	-0.506
	(0.694)	(0.745)	(0.722)	(0.809)	(0.261)	(0.301)
Change in inequality (dGini)	1.501***	1.458***	1.503***	1.416***	-0.0770	0.117
	(0.334)	(0.351)	(0.437)	(0.478)	(0.202)	(0.212)
Initial Gini (lnsGini)	-0.00677	0.000699	0.0165	0.0174	0.00319	0.00191
	(0.0213)	(0.0238)	(0.0328)	(0.0393)	(0.0187)	(0.0242)
Initial life expectancy	-0.189***	-0.167***	-0.194***	-0.140***	-0.0466	-0.0567*
	(0.0273)	(0.0348)	(0.0322)	(0.0391)	(0.0291)	(0.0323)
Constant	0.758***	0.671***	0.788***	0.560***	0.173	0.207*
	(0.117)	(0.151)	(0.132)	(0.161)	(0.116)	(0.119)
Observations	232	232	162	162	56	42
R-squared	0.280	0.304	0.349	0.403	0.170	0.391

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Appendix 2D: Descriptive Statistics

Variable in Levels	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
	Global					SSA				
Poverty headcount at $1.90/day	345	0.1740	0.2051	0.0000	0.8623	68	0.4674	0.2051	0.0021	0.8623
Poverty headcount at $3.20/day	345	0.3321	0.2801	0.0022	0.9631	68	0.6852	0.2091	0.0221	0.9631
Agric. value-add growth (in billion)	345	434	1570.0	-2020.0	8820.0	68	34.20	83.30	-37.30	451.0
Indst. value-add growth (in billion)	345	3560	19200.0	-220000	105000	68	44.60	120.0	-21.00	808.0
Serv. value-add growth (in billion)	345	5280	22200.0	-149000	149000	68	142.00	315.0	-7.34	2240.0
Agric Lab. Prod growth	345	16141.2	71105.66	-567193.7	549990.3	68	2115.6	7666.99	-25498.49	29346.6
Indst. Lab. Prod growth	345	61160.4	921223.4	-6678455	6209622	68	17705.7	93102.81	-157816.80	624536.1
Serv. Lab. Prod growth	345	98018.9	802008	-5751691	1.16E+07	68	-5081.4	98571.00	-716647.60	318098.3
Structural Change	345	0.0070	0.0195	-0.1123	0.1500	68	0.0135	0.0278	-0.0567	0.1500
Productivity growth	345	0.0155	0.0360	-0.1767	0.2775	68	0.0081	0.0456	-0.1767	0.1065
Institutional Quality (IQ)	345	-0.0459	0.7880	-1.5403	2.2561	68	-0.1998	0.7713	-1.5403	1.5009
	EAP					ECA				
Poverty headcount at $1.90/day	86	0.1279	0.1638	0.0000	0.6627	17	0.0106	0.0113	0.0004	0.0387
Poverty headcount at $3.20/day	86	0.3120	0.2765	0.0023	0.9003	17	0.0576	0.0432	0.0137	0.1445
Agric. value-add growth (in billion)	86	1730	2830.0	-2020.0	8820.0	17	0.326	0.455	-0.63	1.08
Indst. value-add growth (in billion)	86	14300	37100.0	-220000	105000	17	8.46	8.850	-12.60	25.90
Serv. value-add growth (in billion)	86	19900	41700.0	-149000	149000	17	28.30	18.10	-13.70	59.10
Agric Lab. Prod growth	86	59488.1	132885.6	-567193.7	549990.3	17	58.96	150.34	-235.80	402.31
Indst. Lab. Prod growth	86	188956.5	1829104	-6678455	6209622	17	762.17	1089.83	-1478.69	2365.09
Serv. Lab. Prod growth	86	323585.4	1569521	-5751691	1.16E+07	17	507.58	1269.30	-2168.29	2675.87
Structural Change	86	0.0090	0.0219	-0.1123	0.0776	17	0.0047	0.0103	-0.0173	0.0263
Productivity growth	86	0.0274	0.0420	-0.1118	0.2775	17	0.0194	0.0332	-0.0700	0.0624
Institutional Quality (IQ)	86	-0.0866	0.7766	-1.4513	2.2561	17	0.0804	0.2425	-0.3422	0.2946
	LAC					MENA				
Poverty headcount at $1.90/day	130	0.0823	0.0610	0.0029	0.2857	20	0.0318	0.0326	0.0022	0.1183
Poverty headcount at $3.20/day	130	0.1754	0.1031	0.0068	0.5001	20	0.1697	0.1409	0.0022	0.4181
Agric. value-add growth (in billion)	130	9.42	32.50	-50.70	206.0	20	0.489	1.210	-2.320	3.840
Indst. value-add growth (in billion)	130	198.00	706.0	-2730.0	4440.0	20	3.31	4.770	-3.060	19.70
Serv. value-add growth (in billion)	130	1080.00	3060.0	-12200.0	14000.0	20	14.80	11.80	0.534	36.70
Agric Lab. Prod growth	130	3198.5	22566.14	-116477.5	84444.48	20	111.33	365.76	-580.05	859.33
Indst. Lab. Prod growth	130	30414.3	311903.8	-1766915	1636637	20	487.02	1888.33	-2323.71	6815.50
Serv. Lab. Prod growth	130	52818.3	289912.6	-1685932	1763961	20	506.70	1341.03	-2851.05	3550.05
Structural Change	130	0.0022	0.0125	-0.0519	0.0411	20	0.0031	0.0064	-0.0070	0.0210
Productivity growth	130	0.0100	0.0227	-0.0626	0.0715	20	0.0153	0.0199	-0.0182	0.0658
Institutional Quality (IQ)	130	0.1300	0.8019	-1.0489	2.0881	20	0.1919	0.8561	-1.0441	1.6058
	SA									
Poverty headcount at $1.90/day	24	0.2195	0.1771	0.0095	0.6668					
Poverty headcount at $3.20/day	24	0.5614	0.2110	0.1100	0.8909					
Agric. value-add growth (in billion)	24	32.10	58.40	-33.20	263.00					
Indst. value-add growth (in billion)	24	92.30	170.0	1.06	749.00					
Serv. value-add growth (in billion)	24	303.00	380.00	6.41	1680.0					
Agric Lab. Prod growth	24	948.85	1673.38	-2457.73	5795.29					
Indst. Lab. Prod growth	24	2325.4	7375.48	-11791.46	24212.15					
Serv. Lab. Prod growth	24	10949.6	32810.82	-19124.00	133471.4					
Structural Change	24	0.0105	0.0165	-0.0306	0.0492					
Productivity growth	24	0.0242	0.0419	-0.0429	0.1675					
Institutional Quality (IQ)	24	-0.7507	0.5040	-1.3842	0.1768					

Appendix 2E: Average Shares of Real Value-Added and Labour Employed in Sectors

Variable Name	Definition
AVat_g	Average share of real value-added in total agriculture
AVmt_g	Average share of real value-added in total manufacturing & industry sector
AVst_g	Average share of real value-added in services sector
AVMind_g	Average share of real value-added in manufacturing industry
AVUind_g	Average share of real value-added in utility industry
AVMCind_g	Average share of real value-added in mining and construction industry sector
AVTTs_g	Average share of real value-added in transport and trade services sector
AVBFRs_g	Average share of real value-added in business, finance, & real estate services sector
AVGovs_g	Average share of real value-added in government services sector
AVOths_g	Average share of real value-added in other services sector
Aωa_g	Average share of labour employed in agriculture
Aωm_g	Average share of labour employed in manufacturing & industry sector
Aωs_g	Average share of labour employed in services sector
AωMind_g	Average share of labour employed in manufacturing industry sector
AωUind_g	Average share of labour employed in utility industry sector
AωMCind_g	Average share of labour employed in mining and construction industry sector
AωTTs_g	Average share of labour employed in transport and trade services sector
AωBFR_g	Average share of labour employed in business, finance, & real estate services sector
AωGov_g	Average share of labour employed in government services sector
A1ωOths_g	Average share of labour employed in other services sector
ALP_g	Average annual labour productivity growth in total agricultural sector
MLP_g	Average annual labour productivity growth in total industry & manufacturing sector
SLP_g	Average annual labour productivity growth in total services sector
MindLP_g	Average annual labour productivity growth in manufacturing industry sector
AωUind_g	Average annual labour productivity growth in utility industry sector
AωMCind_g	Average annual labour productivity growth in mining & construction industry sector
AωTTs_g	Average annual labour productivity growth in transport and trade services sector
AωBFR_g	Average annual labour productivity growth in business, finance, & real estate services
AωGov_g	Average annual labour productivity growth in government services sector
A1ωOths_g	Average annual labour productivity growth in other services sector

Average shares of real value-added in sectors for 1991, 2000, 2010, & 2018

Region	AVat_g	AVmt_g	AVst_g	Avmind_g	Avuind_g	Avmcind_g	AVTTs_g	Avbfrs_g	AvGovs_g	Avoths_g
	1991									
East Asia & Pacific	0.218	0.284	0.498	0.161	0.023	0.101	0.211	0.156	0.102	0.028
Europe & Central Asia	0.126	0.258	0.616	0.153	0.019	0.086	0.220	0.201	0.179	0.016
Latin Ame. & Caribb.	0.079	0.331	0.590	0.186	0.022	0.123	0.199	0.168	0.173	0.050
Md. East N. Africa	0.129	0.317	0.554	0.164	0.021	0.132	0.159	0.187	0.166	0.043
South Asia	0.296	0.214	0.491	0.120	0.016	0.078	0.217	0.116	0.088	0.070
Sub-Saharan Africa	0.254	0.265	0.481	0.124	0.024	0.118	0.161	0.141	0.151	0.027
	2000									
East Asia & Pacific	0.179	0.311	0.509	0.181	0.029	0.102	0.214	0.164	0.100	0.031
Europe & Central Asia	0.109	0.266	0.624	0.168	0.024	0.075	0.249	0.201	0.157	0.017
Latin Ame. & Caribb.	0.077	0.333	0.589	0.183	0.025	0.126	0.199	0.183	0.161	0.046
Md. East N. Africa	0.104	0.319	0.576	0.191	0.021	0.107	0.187	0.186	0.164	0.040
South Asia	0.248	0.239	0.513	0.141	0.018	0.080	0.224	0.126	0.095	0.069
Sub-Saharan Africa	0.248	0.258	0.495	0.120	0.026	0.112	0.176	0.152	0.139	0.028
	2010									

East Asia & Pacific	0.137	0.322	0.541	0.197	0.029	0.097	0.222	0.188	0.101	0.029
Europe & Central Asia	0.093	0.292	0.615	0.178	0.025	0.089	0.242	0.209	0.141	0.023
Latin Ame. & Caribb.	0.070	0.323	0.607	0.170	0.023	0.130	0.203	0.209	0.152	0.042
Md. East N. Africa	0.089	0.307	0.603	0.169	0.021	0.117	0.171	0.218	0.172	0.043
South Asia	0.214	0.244	0.542	0.143	0.016	0.085	0.238	0.143	0.096	0.064
Sub-Saharan Africa	0.209	0.253	0.539	0.114	0.023	0.116	0.204	0.174	0.134	0.028
	2018									
East Asia & Pacific	0.100	0.332	0.568	0.200	0.032	0.100	0.227	0.210	0.102	0.028
Europe & Central Asia	0.071	0.316	0.613	0.189	0.026	0.101	0.257	0.205	0.129	0.022
Latin Ame. & Caribb.	0.070	0.295	0.635	0.153	0.025	0.117	0.209	0.229	0.156	0.042
Md. East N. Africa	0.090	0.272	0.639	0.150	0.022	0.100	0.182	0.241	0.174	0.041
South Asia	0.183	0.249	0.568	0.146	0.017	0.086	0.241	0.163	0.103	0.060
Sub-Saharan Africa	0.180	0.258	0.561	0.109	0.021	0.129	0.210	0.181	0.141	0.029

Average shares of labour employed in sectors for 1991, 2000, 2010, & 2018

Region	**Aωa_g**	**Aωm_g**	**Aωs_g**	**Aωmind_g**	**Aωuind_g**	**Aωmcind_g**	**Aωtts_g**	**Aωbfr_g**	**AωGov_g**	**A1ωoths_g**
	1991									
East Asia & Pacific	0.442	0.204	0.354	0.148	0.004	0.051	0.182	0.050	0.086	0.036
Europe & Central Asia	0.394	0.242	0.364	0.176	0.002	0.064	0.165	0.036	0.120	0.044
Latin Ame. & Caribb.	0.272	0.217	0.511	0.142	0.007	0.068	0.213	0.047	0.136	0.114
Md. East N. Africa	0.255	0.266	0.479	0.165	0.009	0.092	0.163	0.057	0.198	0.061
South Asia	0.603	0.137	0.259	0.103	0.002	0.033	0.120	0.014	0.074	0.052
Sub-Saharan Africa	0.647	0.119	0.234	0.071	0.005	0.043	0.104	0.017	0.061	0.052
	2000									
East Asia & Pacific	0.383	0.201	0.417	0.134	0.004	0.062	0.210	0.067	0.098	0.042
Europe & Central Asia	0.287	0.278	0.435	0.202	0.006	0.070	0.232	0.045	0.115	0.042
Latin Ame. & Caribb.	0.219	0.198	0.583	0.124	0.007	0.067	0.255	0.070	0.136	0.121
Md. East N. Africa	0.229	0.253	0.518	0.149	0.009	0.096	0.186	0.068	0.202	0.063
South Asia	0.564	0.154	0.283	0.104	0.004	0.046	0.147	0.016	0.074	0.046
Sub-Saharan Africa	0.615	0.114	0.271	0.070	0.004	0.040	0.124	0.023	0.069	0.056
	2010									
East Asia & Pacific	0.324	0.196	0.480	0.123	0.005	0.068	0.234	0.090	0.113	0.044
Europe & Central Asia	0.234	0.279	0.487	0.204	0.007	0.068	0.240	0.077	0.128	0.041
Latin Ame. & Caribb.	0.164	0.198	0.638	0.110	0.008	0.079	0.289	0.093	0.139	0.118
Md. East N. Africa	0.200	0.244	0.556	0.128	0.009	0.107	0.195	0.093	0.193	0.075
South Asia	0.490	0.189	0.320	0.119	0.005	0.065	0.183	0.025	0.069	0.044
Sub-Saharan Africa	0.538	0.123	0.339	0.073	0.004	0.046	0.164	0.037	0.076	0.062
	2018									
East Asia & Pacific	0.264	0.215	0.521	0.129	0.005	0.081	0.251	0.104	0.124	0.043
Europe & Central Asia	0.184	0.267	0.549	0.182	0.010	0.075	0.241	0.098	0.171	0.039
Latin Ame. & Caribb.	0.156	0.193	0.651	0.103	0.007	0.083	0.293	0.101	0.140	0.117
Md. East N. Africa	0.164	0.248	0.588	0.122	0.010	0.116	0.210	0.101	0.206	0.071
South Asia	0.410	0.231	0.359	0.136	0.005	0.091	0.202	0.034	0.076	0.047
Sub-Saharan Africa	0.456	0.142	0.402	0.084	0.004	0.054	0.203	0.048	0.085	0.066

Appendix 2F: Regional Dummy Regression Results for Services and Agriculture Value-Added Growth Regressions

Percentiles	**IQ Percentile Value**	***Analysis for Services Value-Added Growth and Institutional Quality (IQ) at $1.90/day poverty headcount***	**VA Percentile Value**	***Analysis for Agriculture Value-Added Growth and Voice and Accountability (VA) at $1.90/day poverty headcount***
East Asia & Pacific		$\frac{\partial(Pov.rt)}{\partial(SVAdgrt)} = -4.329 - 1.634(IQ)$		$\frac{\partial(Pov.rt)}{\partial(Agrigrt)} = -8.506 - 3.887(VA)$
10%	-1.266664	**-2.259**	-1.680548	**-1.974**
25%	-0.7090151	**-3.170**	-1.496714	**-2.688**
50%	-0.502527	**-3.508**	-0.4576739	**-6.727**
75%	0.6708657	**-5.425**	0.1265833	**-8.998**
90%	1.693823	**-7.097**	0.6571436	**-11.060**
99%	2.655968	**-8.669**	0.9488592	**-12.194**
Europe & Cent. Asia		$\frac{\partial(Pov.rt)}{\partial(SVAdgrt)} = 18.050 - 1.634(IQ)$		$\frac{\partial(Pov.rt)}{\partial(Agrigrt)} = -90.590 - 3.887(VA)$
10%	0.0208509	**18.016**	-0.3384197	**-89.275**
25%	0.2974303	**17.564**	-0.2195705	**-89.737**
50%	0.4488009	**17.317**	-0.1368507	**-90.058**
75%	0.4498588	**17.315**	-0.0412864	**-90.430**
90%	0.4587072	**17.300**	0.0002338	**-90.591**
99%	0.4587072	**17.300**	0.0002338	**-90.591**
Lat. Ame. & Caribb.		$\frac{\partial(Pov.rt)}{\partial(SVAdgrt)} = -1.464 - 1.634(IQ)$		$\frac{\partial(Pov.rt)}{\partial(Agrigrt)} = -4.494 - 3.887(VA)$
10%	-0.8446589	**-0.084**	-0.2961141	**-3.343**
25%	-0.5149426	**-0.623**	-0.0597142	**-4.262**
50%	0.097966	**-1.624**	0.1403699	**-5.040**
75%	0.5505355	**-2.364**	0.537074	**-6.582**
90%	2.375884	**-5.346**	1.05612	**-8.599**
99%	2.728313	**-5.922**	1.138346	**-8.919**
Md. East N. Africa		$\frac{\partial(Pov.rt)}{\partial(SVAdgrt)} = -0.883 - 1.634(IQ)$		$\frac{\partial(Pov.rt)}{\partial(Agrigrt)} = -6.022 - 3.887(VA)$
10%	-0.5882149	**0.078**	-1.188054	**-1.404**
25%	-0.5263964	**-0.023**	-0.950093	**-2.329**
50%	0.1460981	**-1.122**	-0.7650635	**-3.048**
75%	1.572831	**-3.453**	0.5838454	**-8.291**
90%	1.759642	**-3.758**	0.6461244	**-8.533**
99%	1.797998	**-3.821**	0.7405438	**-8.900**
South Asia		$\frac{\partial(Pov.rt)}{\partial(SVAdgrt)} = -6.647 - 1.634(IQ)$		$\frac{\partial(Pov.rt)}{\partial(Agrigrt)} = 3.380 - 3.887(VA)$
10%	-1.511121	**-4.178**	-0.9498742	**7.072**
25%	-1.302505	**-4.519**	-0.7994806	**6.488**
50%	-1.073108	**-4.894**	-0.5573441	**5.546**
75%	-0.3400331	**-6.091**	-0.2680953	**4.422**
90%	-0.1216734	**-6.448**	-0.0885491	**3.724**
99%	0.3004254	**-7.138**	0.3999674	**1.825**
Sub-Saharan Africa		$\frac{\partial(Pov.rt)}{\partial(SVAdgrt)} = -2.084 - 1.634(IQ)$		$\frac{\partial(Pov.rt)}{\partial(Agrigrt)} = -4.473 - 3.887(VA)$
10%	-1.584492	**0.505**	-1.194444	**0.170**
25%	-0.8769244	**-0.651**	-0.8488722	**-1.173**
50%	-0.4512233	**-1.347**	-0.2997334	**-3.308**
75%	0.1554704	**-2.338**	0.0561978	**-4.691**
90%	1.223187	**-4.083**	0.6490104	**-6.996**
99%	1.922716	**-5.226**	0.9091737	**-8.007**

Appendix 2G: Regional Dummy Regression Results for Industry Value-Added Growth Regressions at $1.90/day Poverty Headcount Measure

Percentiles	RL Percentile Value	*Analysis for Industry Value-Added Growth and Rule of Law (RL)*	VA Percentile Value	*Analysis for Industry Value-Added Growth and Voice and Account. (VA)*
East Asia & Pacific		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{2.005 - 2.260(RL)}$		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{0.615 - 2.219(VA)}$
10%	-0.7827358	**3.774**	-1.680548	**4.344**
25%	-0.5890847	**3.336**	-1.496714	**3.936**
50%	-0.4898703	**3.112**	-0.4576739	**1.631**
75%	0.3449331	**1.225**	0.1265833	**0.334**
90%	0.8714592	**0.036**	0.6571436	**-0.843**
99%	1.318866	**-0.976**	0.9488592	**-1.491**
Europe & Cent. Asia		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{-17.44 - 2.260(RL)}$		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{-18.710 - 2.219(VA)}$
10%	-0.0273652	**-17.378**	-0.3384197	**-17.959**
25%	0.0050337	**-17.451**	-0.2195705	**-18.223**
50%	0.0747859	**-17.609**	-0.1368507	**-18.406**
75%	0.0830613	**-17.628**	-0.0412864	**-18.618**
90%	0.1597313	**-17.801**	0.0002338	**-18.711**
99%	0.1597313	**-17.801**	0.0002338	**-18.711**
Lat. Ame. & Caribb.		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{-0.258 - 2.260(RL)}$		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{3.947 - 2.219(VA)}$
10%	-0.9745278	**1.944**	-0.2961141	**4.604**
25%	-0.6867918	**1.294**	-0.0597142	**4.080**
50%	-0.3967666	**0.639**	0.1403699	**3.636**
75%	-0.0499485	**-0.145**	0.537074	**2.755**
90%	1.178179	**-2.921**	1.05612	**1.603**
99%	1.365851	**-3.345**	1.138346	**1.421**
Md. East N. Africa		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{0.217 - 2.260(RL)}$		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{-2.006 - 2.219(VA)}$
10%	-0.2897126	**0.872**	-1.188054	**0.630**
25%	-0.2158194	**0.705**	-0.950093	**0.102**
50%	0.0195379	**0.173**	-0.7650635	**-0.308**
75%	0.8173937	**-1.630**	0.5838454	**-3.302**
90%	0.829284	**-1.657**	0.6461244	**-3.440**
99%	0.91604	**-1.853**	0.7405438	**-3.649**
South Asia		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{6.216 - 2.260(RL)}$		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{5.941 - 2.219(VA)}$
10%	-0.9116927	**8.276**	-0.9498742	**8.049**
25%	-0.8870074	**8.221**	-0.7994806	**7.715**
50%	-0.7472192	**7.905**	-0.5573441	**7.178**
75%	-0.1070998	**6.458**	-0.2680953	**6.536**
90%	0.1753448	**5.820**	-0.0885491	**6.137**
99%	0.3302857	**5.470**	0.3999674	**5.053**
Sub-Saharan Africa		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{-0.548 - 2.260(RL)}$		$\frac{\partial(Pov.rt)}{\partial(IVAdgrt)} = \mathbf{-0.808 - 2.219(VA)}$
10%	-1.184693	**2.129**	-1.194444	**1.842**
25%	-0.8016375	**1.264**	-0.8488722	**1.076**
50%	-0.4899282	**0.559**	-0.2997334	**-0.143**
75%	0.0100265	**-0.571**	0.0561978	**-0.933**
90%	0.315762	**-1.262**	0.6490104	**-2.248**
99%	0.9749181	**-2.751**	0.9091737	**-2.825**

Appendix 2H: Regional Dummy Regression Results for Sectoral Labour Productivity Growth Regressions at $1.90/day Poverty Headcount Measure

Percentiles	**RQ Percentile Value**	***Analysis for Services LPG and Regulatory Quality (RQ)***	**CC Percentile Value**	***Analysis for Services LPG and Control of Corruption (CC)***
East Asia & Pacific		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -3.024 - 2.268(RQ)$		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -3.836 - 2.285(CC)$
10%	-0.7218186	**-1.387**	-1.019289	**-1.507**
25%	-0.5594633	**-1.755**	-0.7458543	**-2.132**
50%	-0.1500192	**-2.684**	-0.5617908	**-2.552**
75%	0.243027	**-3.575**	-0.2711895	**-3.216**
90%	0.7318411	**-4.684**	0.3483674	**-4.632**
99%	1.131932	**-5.591**	1.335973	**-6.889**
Europe & Cent. Asia		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -10.39 - 2.268(RQ)$		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -8.269 - 2.285(CC)$
10%	0.1009366	**-10.619**	-0.5218159	**-7.077**
25%	0.2593855	**-10.978**	-0.1478636	**-7.931**
50%	0.2773776	**-11.019**	-0.0313143	**-8.197**
75%	0.3703377	**-11.230**	0.044252	**-8.370**
90%	0.3994922	**-11.296**	0.1123597	**-8.526**
99%	0.3994922	**-11.296**	0.1123597	**-8.526**
Lat. Ame. & Caribb.		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -0.906 - 2.268(RQ)$		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -1.843 - 2.285(CC)$
10%	-0.8793064	**1.088**	-0.7513059	**-0.126**
25%	-0.0781973	**-0.729**	-0.4543453	**-0.805**
50%	0.2093759	**-1.381**	-0.2446972	**-1.284**
75%	0.4532809	**-1.934**	0.0914829	**-2.052**
90%	1.392356	**-4.064**	1.311239	**-4.839**
99%	1.473752	**-4.248**	1.586007	**-5.467**
Md. East N. Africa		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -3.858 - 2.268(RQ)$		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -4.432 - 2.285(CC)$
10%	-0.4751413	**-2.780**	-0.6315338	**-2.989**
25%	-0.183422	**-3.442**	-0.5981032	**-3.065**
50%	-0.0335292	**-3.782**	-0.2578937	**-3.843**
75%	0.8639424	**-5.817**	0.7553718	**-6.158**
90%	1.100534	**-6.354**	0.8307115	**-6.330**
99%	1.216991	**-6.618**	0.8503318	**-6.375**
South Asia		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -5.335 - 2.268(RQ)$		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -6.944 - 2.285(CC)$
10%	-0.8470868	**-3.414**	-1.22003	**-4.156**
25%	-0.7003065	**-3.747**	-1.087688	**-4.459**
50%	-0.5215249	**-4.152**	-1.00465	**-4.648**
75%	-0.3769773	**-4.480**	-0.4111507	**-6.005**
90%	-0.2728167	**-4.716**	-0.2000842	**-6.487**
99%	0.1947514	**-5.777**	-0.1835918	**-6.524**
Sub-Saharan Africa		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -1.732 - 2.268(RQ)$		$\frac{\partial(Pov.rt)}{\partial(SLPgrt)} = -2.168 - 2.285(CC)$
10%	-0.9752049	**0.480**	-1.020625	**0.164**
25%	-0.5432987	**-0.500**	-0.8051588	**-0.328**
50%	-0.2885397	**-1.078**	-0.5084467	**-1.006**
75%	-0.0368938	**-1.648**	-0.011932	**-2.141**
90%	0.4988977	**-2.863**	0.3537554	**-2.976**
99%	0.9906248	**-3.979**	0.9599887	**-4.362**

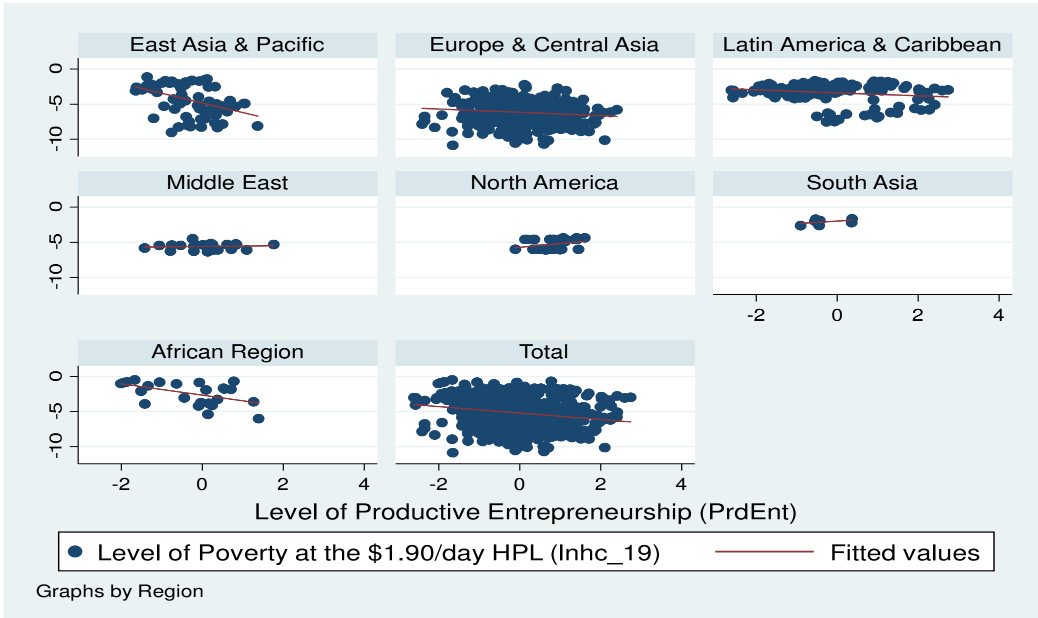
Appendix 2I: Regional Dummy Regression Results for Structural Transformation Regressions at $1.90/day Poverty Headcount Measure

Percentiles	**VA Percentile Value**	***Analysis for Structural Transformation and Voice and Account. (VA)***
East Asia & Pacific (EAP)		$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = -5.651 - 2.492(VA)$
10%	-1.680548	**-1.463**
25%	-1.496714	**-1.921**
50%	-0.4576739	**-4.510**
75%	0.1265833	**-5.966**
90%	0.6571436	**-7.289**
99%	0.9488592	**-8.016**
Europe & C. As. (ECA)		$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = -1.670 - 2.492(VA)$
10%	-0.3384197	**-0.827**
25%	-0.2195705	**-1.123**
50%	-0.1368507	**-1.329**
75%	-0.0412864	**-1.567**
90%	0.0002338	**-1.671**
99%	0.0002338	**-1.671**
Lat. Amr. & Car. (LAC)		$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = 1.885 - 2.492(VA)$
10%	-0.2961141	**2.623**
25%	-0.0597142	**2.034**
50%	0.1403699	**1.535**
75%	0.537074	**0.547**
90%	1.05612	**-0.747**
99%	1.138346	**-0.952**
Md. East & N. Af (MENA)		$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = 5.519 - 2.492(VA)$
10%	-1.188054	**8.480**
25%	-0.950093	**7.887**
50%	-0.7650635	**7.426**
75%	0.5838454	**4.064**
90%	0.6461244	**3.909**
99%	0.7405438	**3.674**
South Asia (SA)		$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = -1.042 - 2.492(VA)$
10%	-0.9498742	**1.325**
25%	-0.7994806	**0.950**
50%	-0.5573441	**0.347**
75%	-0.2680953	**-0.374**
90%	-0.0885491	**-0.821**
99%	0.3999674	**-2.039**
Sub-Saharan Africa (SSA)		$\frac{\partial(Pov.rt)}{\partial(ST.\ grt)} = -1.362 - 2.492(VA)$
10%	-1.194444	**1.615**
25%	-0.8488722	**0.753**
50%	-0.2997334	**-0.615**
75%	0.0561978	**-1.502**
90%	0.6490104	**-2.979**
99%	0.9091737	**-3.628**

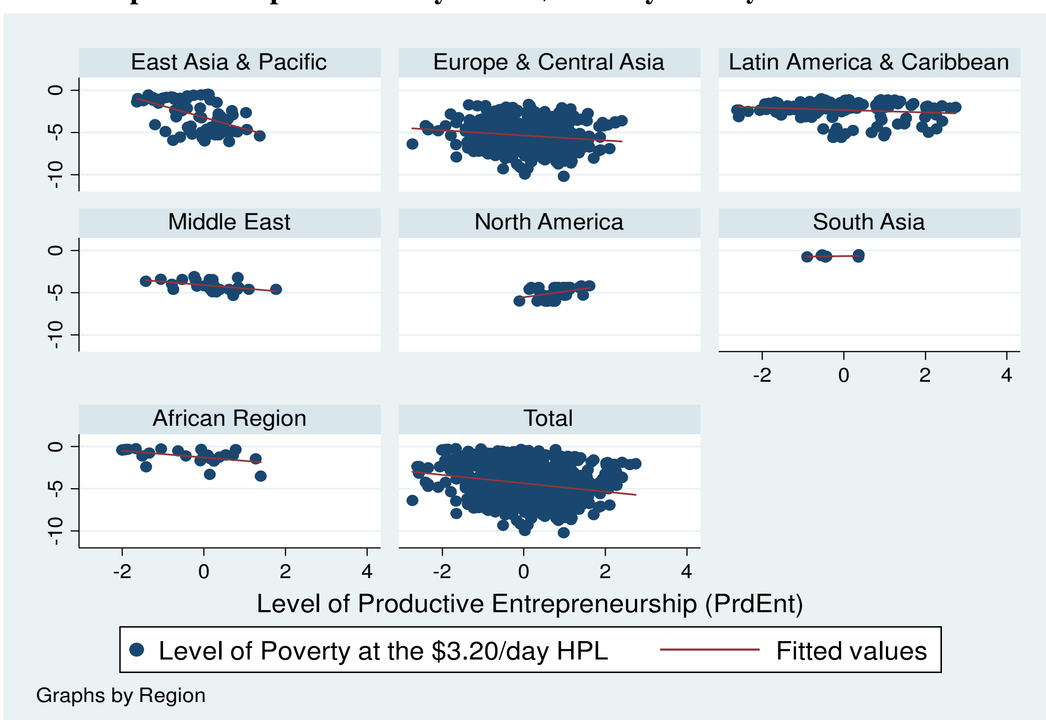
Appendix Three: Appendices to Chapter Four

Appendix 3A1: Scatter Plots and Correlation Analyses

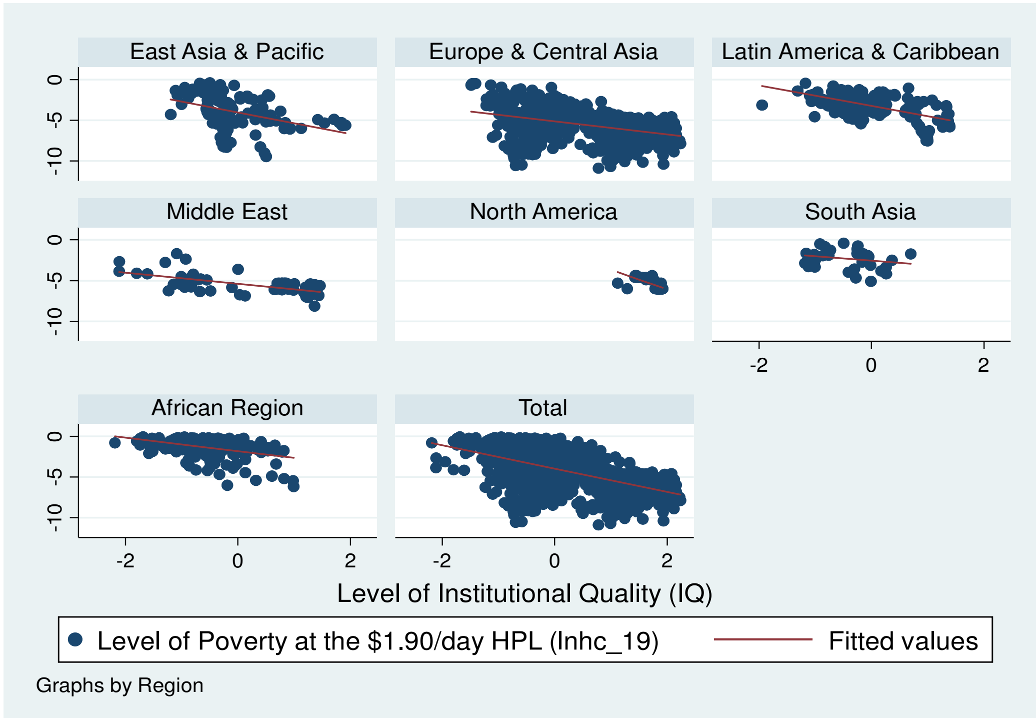
Appendix 3A1a: Scatter Plots for Correlation Between the Levels of Productive Entrepreneurship and Poverty at $1.90/day Poverty Headcount Measure



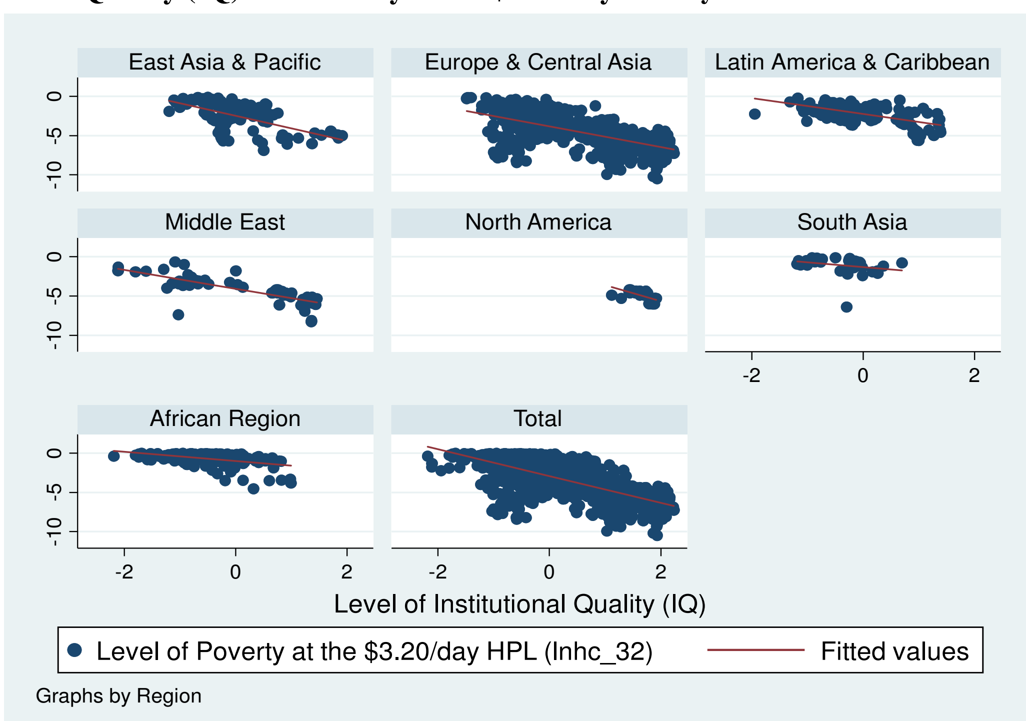
Appendix 3A1b: Scatter Plots for Correlation Between the Levels of Productive Entrepreneurship and Poverty at the $1.90/day Poverty Headcount Measure



Appendix 3A1c: Scatter Plots for Correlation Between the Levels of Institutional Quality (IQ) and Poverty at the $1.90/day Poverty Headcount Measure



Appendix 3A1d: Scatter Plots for Correlation Between the Levels of Institutional Quality (IQ) and Poverty at the $3.20/day Poverty Headcount Measure



Appendix 3B1: Test for Endogeneity and Instrument Validity for Regional Dummy Models without IQ Terms at $3.20/day Headcount Poverty Measure

	$3.20/day headcount poverty measure					
	Global sample with regional dummies					
*Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)*	Ho: var are exog.: Durbin (sc.) chi2(3) **= (p = 0.0000)** Wu-Haum. F(6,777) = **(p = 0.0000)**					
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.0000**					
First Stage Regressions						
Endogenous variable	**PE*EAP**	**PE*ECA**	**PE*LAC**	**PE*ME**	**PE*SA**	**PE*SSA**
Instrumental variables						
Interaction between (R_Tit) and EAP region dummy	-0.001*** (0.000)					
Interaction between (R_Tit) and ECA region dummy		0.002* (0.001)				
Interaction between (R_Tit) and LAC region dummy			-0.005*** (0.001)			
Interaction between (R_Tit) and Mid. East region dummy				0.002*** (0.001)		
Interaction between (R_Tit) and SA region dummy					-0.002*** (0.000)	
Interaction between (R_Tit) and Africa region dummy						-0.005*** (0.000)
Observations	789	789	789	789	789	789
R-square	0.1357	0.0189	0.1155	0.1243	0.3119	0.2836
Test for Instrument Validity						
t-value for instrument	-7.82	1.84	-9.18	8.67	-16.51	-16.33
F-value	14.9297	1.10368	14.9568	15.7338	53.459	49.611
Prob > F	0.0000	0.3583	0.0000	0.0000	0.0000	0.0000
Partial R-Square	0.1031	0.0084	0.1033	0.1081	0.2917	0.2765
Shea's Partial R-Square	0.0976	0.0016	0.0208	0.0994	0.2390	0.2528

Note: *PE = Level of Productive Entrepreneurship; EAP = East Asia & Pacific; ECA = Europe & Central Asia; LAC = Latin America & Caribbean; ME = Middle East; SA = South Asia; and (R_Tit) = Interaction of natural log of annual mean rainfall/precipitation and annual mean temperature.*

Appendix 3B2: Test for Endogeneity and Instrument Validity for Non-regional Dummy Models with IQ Terms at $3.20/day Headcount Poverty Measure

	Global sample without regional dummies			**African sample**		
*Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)*	Ho: variables are exogenous: Durbin (score) chi2(3) **= (p = 0.0000)** Wu-Hausman F(3,726) **= (p = 0.0000)**			Ho: variables are exogenous: Durbin (score) chi2(3) **= (p = 0.0010)** Wu-Hausman F(3,13) **= (p = 0.0009)**		
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.0000**			**Prob>chi2 = 0.0102**		
First Stage Regressions						
Endogenous variable	**PE**	**IQ**	**PE*IQ**	**PE**	**IQ**	**PE*IQ**
Instrumental variables						
Interaction of log of annual mean rainfall & annual mean temp. **(R_T_{it})**	-0.006*** (0.002)					
Lagged value of the natural log of GDP per capita **(lnGDPpc_1)**				1.358** (0 .537)		
Absolute Latitude **(Lat_abs)**		4.110*** (0.423)			-30.08 ** (12.267)	
Interaction term of **R_T_{it} & Lat_abs [(R_T_{it})*(Lat_abs)]**			-0.001 (0.003)			
Interaction term of **lnGDPpc_1 & Lat_abs [(lnGDPpc_1)*(Lat_abs)]**						3.073 (1.766)
Observations	744	744	744	23	23	23
R-square	0.0957	0.6388	0.0133	0.7752	0.687	0.6722
Test for Instrument Validity						
t-value for instrument	-3.20	9.71	0.30	2.53	-2.45	1.74
F-value	19.6578	95.9262	2.75233	11.3009	7.7341	5.2436
Prob > F	0.0000	0.0000	0.0417	0.0003	0.0021	0.0104
Partial R-Square	0.0741	0.2808	0.0111	0.6794	0.5919	0.4958
Shea's Partial R-Square	0.0351	0.1394	0.0090	0.1692	0.5065	0.1386

Note: *PE = Level of Productive Entrepreneurship; and IQ = Institutional Quality*

Appendix 3B3: Test for Endogeneity and Instrument Validity for Regional Dummy Models with IQ Terms

	$3.20/day Poverty Line							
	Global sample with regional dummies							
*Separated Durbin (1954), and Wu (1973)-Hausman (1978) Test for Endogeneity (using **estat endogenous** or **ivendog** Stata commands)*	Ho: var are exog.: Durbin (sc.) chi2(3) **= (p = 0.0000)** Wu-Haum. F(8,7240) = **(p = 0.0000)**							
Durbin-Wu-Hausman (DWH) Test of Endogeneity for comparing OLS to IV regressions	**Prob>chi2 = 0.0000**							
First Stage Regressions								
Endogenous variable	**PE*EAP**	**PE*ECA**	**PE*LAC**	**PE*ME**	**PE*SA**	**PE*SSA**	**IQ**	**PE*IQ**
Instrumental variables								
Interaction between (R_Tit) and EAP region dummy	-0.003*** (0.000)							
Interaction between (R_Tit) and ECA region dummy		0.003 (0.002)						
Interaction between (R_Tit) and LAC region dummy			-0.011*** (0.001)					
Interaction between (R_Tit) and Md. East region dummy				0.002*** (0.000)				
Interaction between (R_Tit) and SA region dummy					- 0.002*** (0.000)			
Interaction between (R_Tit) and Africa region dummy						-0.006*** (0.001)		
Absolute Latitude **(Lat_abs)**							4.336*** (0.423)	
Interaction of R_Tit and Lat_abs **(R_Tit*Lat_abs)**								0.011*** (0.004)
Observations	744	744	744	744	744	744	744	744
R-square	0.1935	0.0537	0.1572	0.1275	0.3140	0.3281	0.6522	0.0371
Test for Instrument Validity								
t-value for instrument	-6.48	1.63	-9.23	5.07	-10.47	-11.66	10.26	2.63
F-value	18.1563	3.72099	15.2278	11.1521	37.6084	43.113	40.6243	3.30813
Prob > F	0.0000	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010
Partial R-Square	0.1656	0.0391	0.1427	0.1086	0.2913	0.3203	0.3075	0.0349
Shea's Partial R-Square	0.0880	0.0142	0.0485	0.0821	0.2669	0.2796	0.0661	0.0310

Note: *PE = Level of Productive Entrepreneurship; EAP = East Asia & Pacific; ECA = Europe & Central Asia; LAC = Latin America & Caribbean; ME = Middle East; SA = South Asia; and (R_Tit) = Interaction of natural log of annual mean rainfall/precipitation and annual mean temperature.*

Appendix 3B4: OLS Regression Results at $1.90/day Poverty Headcount Measure

Dependent Variable: log $1.90/day poverty headcount measure (lnhc_19$_{it}$)						
	Global Sample Models without IQ		Global Sample Models with IQ		African Sample	
Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Productive Entrepreneurship (PE)	-0.302***		-0.258***		-0.846***	-0.911**
	(0.0615)		(0.0830)		(0.210)	(0.316)
Institutional Quality (IQ)			-0.347***	-0.330***		-1.155***
			(0.108)	(0.105)		(0.336)
PE*IQ			-0.0224	-0.179*		-0.473
			(0.0748)	(0.101)		(0.429)
PE * *regional dummy variables*						
East Asia and Pacific (EAP)		-1.148***		-0.994***		
		(0.259)		(0.280)		
Europe & Central Asia (ECA)		-0.185*		-0.00516		
		(0.0989)		(0.168)		
Latin America & Caribbean (LAC)		-0.185***		-0.109*		
		(0.0580)		(0.0586)		
Middle East (ME)		-0.236		-0.0488		
		(0.403)		(0.377)		
South Asia (SA)		-3.249***		-3.009**		
		(1.219)		(1.226)		
Africa		-1.185***		-1.226***		
		(0.207)		(0.199)		
Gross domestic capital formation	0.0149	0.0064	0.00526	-0.00282	-0.0533	-0.0251
	(0.0093)	(0.0089)	(0.00931)	(0.00882)	(0.0353)	(0.0482)
Share of labour force in pop. (lnLfpop)	-2.825***	-2.504***	-2.167***	-1.766***	-0.930	-1.800
	(0.519)	(0.519)	(0.614)	(0.581)	(2.493)	(2.196)
Gini Income Inequality (lnGini)	5.640***	5.661***	4.684***	4.817***	4.226***	5.852***
	(0.230)	(0.228)	(0.355)	(0.362)	(1.017)	(1.037)
Constant	-1.965***	-1.540***	-2.001***	-1.399**	1.398	0.985
	(0.571)	(0.578)	(0.609)	(0.603)	(2.076)	(1.964)
Observations	745	745	707	707	25	23
R-squared	0.460	0.483	0.461	0.485	0.702	0.793

Appendix 3B5: OLS Regression Results at $3.2/day Poverty Headcount Measure

Dependent Variable: log $3.20/day poverty headcount measure (lnhc_32$_{it}$)						
	Global Sample Models without IQ		Global Sample Models with IQ		African Sample	
Variable in Levels	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Productive Entrepreneurship (PE)	-0.283***		-0.0943*		-0.503***	-0.493*
	(0.0469)		(0.0568)		(0.159)	(0.278)
Institutional Quality (IQ)			-0.953***	-0.929***		-0.663**
			(0.0755)	(0.0740)		(0.237)
PE*IQ			-0.0782	-0.182**		-0.256
			(0.0569)	(0.0741)		(0.364)
PE * *regional dummy variables*						
East Asia and Pacific (EAP)		-1.179***		-0.899***		
		(0.211)		(0.193)		
Europe & Central Asia (ECA)		-0.245***		0.0501		
		(0.0686)		(0.111)		
Latin America & Caribbean (LAC)		-0.0933*		0.0853**		
		(0.0520)		(0.0408)		
Middle East (ME)		-0.429		-0.0138		
		(0.368)		(0.332)		
South Asia (SA)		-3.656***		-2.851***		
		(1.177)		(1.090)		
Africa		-0.781***		-0.730***		
		(0.213)		(0.162)		
Gross domestic capital formation	0.0464***	0.0389***	0.0204***	0.0138**	-0.0517**	-0.0190
	(0.0088)	(0.0085)	(0.00716)	(0.00666)	(0.0247)	(0.0318)
Share of labour force in pop.	-3.766***	-3.484***	-1.734***	-1.442***	-1.422	-1.826
	(0.450)	(0.463)	(0.433)	(0.417)	(1.752)	(1.677)
Gini Income Inequality (lnGini)	6.220***	6.262***	4.011***	4.145***	2.054**	2.818***
	(0.210)	(0.204)	(0.268)	(0.272)	(0.742)	(0.913)
Constant	-1.811***	-1.412***	-1.298***	-0.816*	0.257	-0.373
	(0.493)	(0.505)	(0.448)	(0.446)	(1.465)	(1.355)
Observations	789	789	748	748	25	23
R-squared	0.602	0.623	0.692	0.710	0.564	0.635

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fourth columns*

Appendix 3C1: OLS Regression Results for Impact of Interaction Terms on Poverty for different Levels of IQ and PE at \$1.90 and \$3.20/day Poverty Headcount Measures

Percentile	*Percentile values*	*Analysis for levels of IQ and PE at \$1.90/day poverty headcount measure*	*Analysis for levels of IQ and PE at \$3.20/day poverty headcount measure*
East Asia & Pacific (EAP)	***IQ percentile values***	$\frac{\partial(lnPov)}{\partial(PE)} = -0.994 + (-0.179) * sIQ$	$\frac{\partial(lnPov)}{\partial(PE)} = -0.899 + (-0.182) * sIQ$
10%	-1.211847	**-0.777**	**-0.678**
25%	-0.721832	**-0.865**	**-0.768**
50%	-0.153233	**-0.967**	**-0.871**
75%	0.737787	**-1.126**	**-1.033**
90%	1.501795	**-1.263**	**-1.172**
99%	2.059107	**-1.363**	**-1.274**
Europe & Central Asia (ECA)		$\frac{\partial(lnPov)}{\partial(PE)} = -0.00516 + (-0.179) * sIQ$	$\frac{\partial(lnPov)}{\partial(PE)} = 0.0501 + (-0.182) * sIQ$
10%	-1.211847	**0.212**	**0.271**
25%	-0.721832	**0.124**	**0.181**
50%	-0.153233	**0.022**	**0.078**
75%	0.737787	**-0.137**	**-0.084**
90%	1.501795	**-0.274**	**-0.223**
99%	2.059107	**-0.374**	**-0.325**
Latin America & Caribbean (LAC)		$\frac{\partial(lnPov)}{\partial(PE)} = -0.109 + (-0.179) * sIQ$	$\frac{\partial(lnPov)}{\partial(PE)} = 0.0853 + (-0.182) * sIQ$
10%	-1.211847	**0.108**	**0.306**
25%	-0.721832	**0.020**	**0.217**
50%	-0.153233	**-0.082**	**0.113**
75%	0.737787	**-0.241**	**-0.049**
90%	1.501795	**-0.378**	**-0.188**
99%	2.059107	**-0.478**	**-0.289**
Middle East		$\frac{\partial(lnPov)}{\partial(PE)} = -0.0488 + (-0.179) * sIQ$	$\frac{\partial(lnPov)}{\partial(PE)} = -0.0138 + (-0.182) * sIQ$
10%	-1.211847	**0.168**	**0.207**
25%	-0.721832	**0.080**	**0.118**
50%	-0.153233	**-0.021**	**0.014**
75%	0.737787	**-0.181**	**-0.148**
90%	1.501795	**-0.318**	**-0.287**
99%	2.059107	**-0.417**	**-0.389**
South Asia (SA)		$\frac{\partial(lnPov)}{\partial(PE)} = -3.009 + (-0.179) * sIQ$	$\frac{\partial(lnPov)}{\partial(PE)} = -2.851 + (-0.182) * sIQ$
10%	-1.211847	**-2.792**	**-2.630**
25%	-0.721832	**-2.880**	**-2.720**
50%	-0.153233	**-2.982**	**-2.823**
75%	0.737787	**-3.141**	**-2.985**
90%	1.501795	**-3.278**	**-3.124**
99%	2.059107	**-3.378**	**-3.226**
Africa		$\frac{\partial(lnPov)}{\partial(PE)} = -1.226 + (-0.179) * sIQ$	$\frac{\partial(lnPov)}{\partial(PE)} = -0.730 + (-0.182) * sIQ$
10%	-1.211847	**-1.009**	**-0.509**
25%	-0.721832	**-1.097**	**-0.599**
50%	-0.153233	**-1.199**	**-0.702**
75%	0.737787	**-1.358**	**-0.864**
90%	1.501795	**-1.495**	**-1.003**
99%	2.059107	**-1.595**	**-1.105**

Appendix 3C2: 2SLS IV Results for Impact of Interaction Terms on Poverty for different Percentile Values of IQ and PE at \$1.90 and \$3.20/day Poverty Headcount Measures

	Percentile values	*Analysis for levels of IQ and PE at \$1.9 per day PL*	*Analysis for levels of IQ and PE at \$3.2 per day PL*
Models without Regional Dummy Variables			
Percentile	*IQ percentile values*	$\frac{\partial(lnPov.level)}{\partial(PE)} = -0.093 - 2.904\,(IQ)$ *sIQ at 10p, 25p, 50p, 75p, 90p, 99p*	$\frac{\partial(lnPov.lev)}{\partial(PE)} = -0.289 - 1.847(IQ)$ *sIQ at 10p, 25p, 50p, 75p, 90p, 99p*
10^{th}P	-1.211847	**3.612**	**1.949**
25^{th}P	-0.7218319	**2.189**	**1.044**
50^{th}P	-0.1532326	**0.538**	**-0.006**
75^{th}P	0.737787	**-2.050**	**-1.652**
90^{th}P	1.501795	**-4.268**	**-3.063**
99^{th}P	2.059107	**-5.887**	**-4.092**

***The 10^{th}P, 25^{th}P, 50^{th}P, 75^{th}P, 90^{th}P, & 99^{th}P values used are obtained from detailed descriptive statistics*

Appendix 3C3: 2SLS IV Regression Results for Impact of Interaction Terms on Poverty for different Levels of Voice and Accountability (VA) Dimensions of IQ and PE at \$1.90 and \$3.20/day Poverty Headcount Measures

With Regional Dummies			
Percentiles	**Percentile values (VA)**	***Analysis for levels of VA and PE at \$1.90/day poverty headcount measure***	***Analysis for levels of VA and PE at \$3.20/day poverty headcount measure***
IV Regional Dummies			
East Asia & Pacific (EAP)		$\frac{\partial(lnPov)}{\partial(PE)} = 3.104 + (-2.128) * VA$	$\frac{\partial(lnPov)}{\partial(PE)} = 0.661 + (-1.402) * VA$
10%	-1.526949	**6.353**	**2.802**
25%	-0.5296669	**4.231**	**1.404**
50%	0.184858	**2.711**	**0.402**
75%	0.8073976	**1.386**	**-0.471**
90%	1.186718	**0.579**	**-1.003**
99%	1.606078	**-0.314**	**-1.591**
Europe & Central Asia (ECA)		$\frac{\partial(lnPov)}{\partial(PE)} = 2.545 + (-2.128) * VA$	$\frac{\partial(lnPov)}{\partial(PE)} = 3.212 + (-1.402) * VA$
10%	-1.205579	**5.110**	**4.902**
25%	-0.1422317	**2.848**	**3.411**
50%	0.8914437	**0.648**	**1.962**
75%	1.32327	**-0.271**	**1.357**
90%	1.531794	**-0.715**	**1.064**
99%	1.694412	**-1.061**	**0.836**
Latin America & Caribbean (LAC)		$\frac{\partial(lnPov)}{\partial(PE)} = -0.202 + (-2.128) * VA$	$\frac{\partial(lnPov)}{\partial(PE)} = 0.227 + (-1.402) * VA$
10%	-0.5363405	**0.939**	**0.979**
25%	-0.0750128	**-0.042**	**0.332**
50%	0.4428289	**-1.144**	**-0.394**
75%	0.9345739	**-2.191**	**-1.083**
90%	1.105795	**-2.555**	**-1.323**
99%	1.279368	**-2.924**	**-1.567**
Middle East		$\frac{\partial(lnPov)}{\partial(PE)} = -2.622 + (-2.128) * VA$	$\frac{\partial(lnPov)}{\partial(PE)} = -3.217 + (-1.402) * VA$
10%	-1.702851	**1.002**	**-0.830**
25%	-1.300999	**0.147**	**-1.393**
50%	-0.9039665	**-0.698**	**-1.950**
75%	-0.5142884	**-1.528**	**-2.496**
90%	0.6972239	**-4.106**	**-4.195**
99%	1.372729	**-5.543**	**-5.142**
South Asia (SA)		$\frac{\partial(lnPov)}{\partial(PE)} = -13.192 + (-2.128) * VA$	$\frac{\partial(lnPov)}{\partial(PE)} = -13.660 + (-1.402) * VA$
10%	-1.146782	**-10.752**	**-12.052**

25%	-0.9274184	**-11.218**	**-12.360**
50%	-0.5120469	**-12.102**	**-12.942**
75%	-0.1357345	**-12.903**	**-13.470**
90%	0.3999674	**-14.043**	**-14.221**
99%	1.289108	**-15.935**	**-15.467**
Africa		$\frac{\partial(lnPov)}{\partial(PE)} = -3.381 + (-2.128) * VA$	$\frac{\partial(lnPov)}{\partial(PE)} = -2.121 + (-1.402) * VA$
10%	-1.549572	**-0.084**	**0.051**
25%	-1.214586	**-0.796**	**-0.418**
50%	-0.7085341	**-1.873**	**-1.128**
75%	-0.1130232	**-3.140**	**-1.963**
90%	0.4318844	**-4.300**	**-2.727**
99%	0.9569727	**-5.417**	**-3.463**

Appendix 3C4: 2SLS IV Regression Results for Impact of Interaction Terms on Poverty for different Levels of Regulatory Quality (RQ) Dimensions of IQ and PE at the $1.90 and $3.20/day Poverty Headcount Measures – Regional Dummies

Percentiles	**Percentile values**	***Analysis for levels of IQ and PE at $1.90/day poverty headcount measure***
East Asia & Pacific (EAP)	**RQ percentile value**	$\frac{\partial(lnPov)}{\partial(PE)} = 2.298 + (-2.412) * RQ$
10%	-1.202818	**5.199**
25%	-0.791912	**4.208**
50%	-0.2979653	**3.017**
75%	0.7176718	**0.567**
90%	1.763689	**-1.956**
99%	2.180612	**-2.962**
Europe & Central Asia (ECA)		$\frac{\partial(lnPov)}{\partial(PE)} = 1.428 + (-2.412) * RQ$
10%	-0.7347551	**3.200**
25%	-0.1301474	**1.742**
50%	0.8445592	**-0.609**
75%	1.36163	**-1.856**
90%	1.716271	**-2.712**
99%	1.91417	**-3.189**
Latin America & Caribbean (LAC)		$\frac{\partial(lnPov)}{\partial(PE)} = 0.633 + (-2.412) * RQ$
10%	-0.9240948	**2.862**
25%	-0.4467168	**1.710**
50%	0.1749342	**0.211**
75%	0.4854296	**-0.538**
90%	0.8861196	**-1.504**
99%	1.494421	**-2.972**
Middle East		$\frac{\partial(lnPov)}{\partial(PE)} = -2.075 + (-2.412) * RQ$
10%	-1.42351	**1.359**
25%	-0.8045793	**-0.134**
50%	0.0833356	**-2.276**
75%	0.6762518	**-3.706**
90%	1.114325	**-4.763**
99%	1.430892	**-5.526**
South Asia (SA)		$\frac{\partial(lnPov)}{\partial(PE)} = -8.242 + (-2.412) * RQ$

10%	-1.169393	**-5.421**
25%	-0.8489474	**-6.194**
50%	-0.5329705	**-6.956**
75%	-0.3105174	**-7.493**
90%	0.06473	**-8.398**
99%	1.02667	**-10.718**
Africa		$\frac{\partial(lnPov)}{\partial(PE)} = -2.902 + (-2.412) * RQ$
10%	-1.479442	**0.666**
25%	-1.110248	**-0.224**
50%	-0.6550638	**-1.322**
75%	-0.2846214	**-2.215**
90%	0.02156	**-2.954**
99%	1.018246	**-5.358**

Appendix Four: Appendices on Regression Results for IQ Dimensions

Appendix 4A: Chapter Two Regression Results for IQ Dimensions at $1.90/day Poverty Headcount Measure

Regression Results for Political Stability and Absence of Violence (PSV) Dimension of IQ

Dependent Variable: Δlog $1.90/day poverty headcount measure, $\Delta loghc\_19_{it}$						
	Global Sample					
	PWT Growth Dataset		**WDI Growth Dataset**		**PovcalNet Growth Data**	
Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	IV-2SLS	IV-2SLS	OLS	OLS	IV-2SLS	OLS
Growth (in annualised log change)	-2.4770***		-2.805***		-3.2142***	
	(0.2813)		(0.347)		(0.233)	
Pol. St. & abs. Vio, (PSV)	0.0792***	0.0906***	0.0308***	0.0214*	0.0976***	0.0173*
	(0.0288)	(0.0296)	(0.0110)	(0.0120)	(0.0370)	(0.00888)
Growth*PSV	-2.5157***	-1.7652***	-1.317***	-1.044**	-3.1926***	-0.458**
	(0.4016)	(0.4749)	(0.355)	(0.410)	(0.858)	(0.224)
Growth * regional dummy variables						
East Asia and Pacific (EAP)		-2.7788***		-3.267***		-3.553***
		(0.3918)		(0.472)		(0.303)
Europe & Central Asia (ECA)		-2.4572***		-3.007***		-3.313***
		(0.2864)		(0.529)		(0.287)
Latin America & Caribbean (LAC)		-1.1882***		-2.372***		-1.960***
		(0.3925)		(0.388)		(0.199)
Middle East & North Africa (MENA)		-1.9995***		-2.460**		-2.815***
		(0.6243)		(1.085)		(1.054)
North America (NA)		0.5915		1.186		-1.769
		(2.6265)		(1.276)		(1.641)
South Asia (SA)		-2.1855***		-2.722***		-3.768***
		(0.7864)		(0.501)		(0.534)
Sub-Saharan Africa (SSA)		-1.4444***		-1.252**		-1.406***
		(0.5497)		(0.489)		(0.208)
Change in inequality (dGini)	2.3783***	2.6297***	2.622***	2.636***	3.5997***	3.705***
	(0.4637)	(0.4501)	(0.459)	(0.478)	(0.434)	(0.411)
Initial education index	-0.0428	-0.0670*	-0.0538***	-0.0252	-0.0865**	-0.0201
	(0.0356)	(0.0348)	(0.0154)	(0.0195)	(0.0375)	(0.0145)
Constant	-0.0253	-0.0458**	-0.0322**	-0.0227	-0.0303	-0.00913
	(0.0223)	(0.0207)	(0.0131)	(0.0147)	(0.0184)	(0.0122)
Observations	463	463	508	508	498	508
R-squared	0.127	0.2134	0.232	0.249	0.210	0.446

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: *PWT = Penn World Tables; WDI = World Development Indicator; Growth = Δlog (Per capita GDP/Mean Income); Regional dummy variables are included in the models in the second, fourth, and sixth columns*

Notes: *Regional dummy variables are included in the models in the second, fourth, and sixth columns*

Regression Results for Regulatory Quality (RQ) Dimension of IQ

Dependent Variable: Δlog $1.90/day poverty headcount measure, Δloghc_19$_{it}$						
	Global Sample					
	PWT Growth Dataset		**WDI Growth Dataset**		**PovcalNet Growth Data**	
Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	IV-2SLS	IV-2SLS	OLS	OLS	IV-2SLS	OLS
Growth (in annualised log change)	-2.0942***		-2.365***		-2.8562***	
	(0.321)		(0.330)		(0.190)	
Regulatory Quality (RQ)	0.0656*	0.0796**	0.0493***	0.0393***	0.0564**	0.0365***
	(0.0348)	(0.037)	(0.0133)	(0.0145)	(0.0278)	(0.0105)
Growth*RQ	-2.9330***	-3.4134***	-1.108**	-0.888*	-2.3711***	-0.150
	(0.531)	(1.210)	(0.432)	(0.519)	(0.626)	(0.232)
Growth * regional dummy variables						
East Asia and Pacific (EAP)		-3.3489***		-2.994***		-3.382***
		(0.711)		(0.496)		(0.333)
Europe & Central Asia (ECA)		-1.6561***		-2.669***		-3.237***
		(0.380)		(0.576)		(0.275)
Latin America & Caribbean (LAC)		-0.9050**		-1.920***		-1.783***
		(0.456)		(0.404)		(0.205)
Middle East & North Africa (MENA)		-2.8150***		-1.788*		-2.571***
		(1.038)		(1.029)		(0.975)
North America (NA)		2.5430		0.763		-2.319
		(3.127)		(1.347)		(1.597)
South Asia (SA)		-2.5950***		-2.041***		-3.600***
		(0.965)		(0.488)		(0.531)
Sub-Saharan Africa (SSA)		-2.6435**		-0.907**		-1.413***
		(1.081)		(0.418)		(0.212)
Change in inequality (dGini)	2.4597***	2.8513***	2.463***	2.521***	3.3520***	3.532***
	(0.5011)	(0.535)	(0.451)	(0.467)	(0.432)	(0.402)
Initial education index	-0.0196	-0.0506	-0.0888***	-0.0551**	-0.0565	-0.0614***
	(0.062)	(0.063)	(0.0208)	(0.0240)	(0.0442)	(0.0171)
Constant	-0.0239	-0.0464	-0.0678***	-0.0524***	-0.0311	-0.0415***
	(0.049)	(0.051)	(0.0177)	(0.0197)	(0.0309)	(0.0136)
Observations	463	463	509	509	499	509
R-squared	0.053	0.043	0.231	0.249	0.281	0.457

Regression Results for Government Effectiveness (GE) Dimension of IQ

Dependent Variable: Δlog $1.90/day poverty headcount measure, Δloghc_19$_{it}$						
	Global Sample					
	PWT Growth Dataset		**WDI Growth Dataset**		**PovcalNet Growth Data**	
Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	IV-2SLS	IV-2SLS	OLS	OLS	IV-2SLS	OLS
Growth (in annualised log change)	-2.3263***		-2.516***		-3.0857***	
	(0.351)		(0.331)		(0.2094)	
Government effectiveness (GE)	0.0541*	0.0656**	0.0411***	0.0312**	0.0409*	0.0328***
	(0.0279)	(0.027)	(0.0131)	(0.0146)	(0.0228)	(0.0112)
Growth*GE	-2.8947***	-2.5661***	-1.334***	-1.050**	-2.4137***	-0.252
	(0.571)	(0.883)	(0.467)	(0.532)	(0.6569)	(0.285)
Growth * regional dummy variables						
East Asia and Pacific (EAP)		-3.0078***		-3.105***		-3.531***
		(0.483)		(0.478)		(0.330)
Europe & Central Asia (ECA)		-2.1432***		-2.789***		-3.218***
		(0. .332)		(0.560)		(0.286)
Latin America & Caribbean (LAC)		-1.2812***		-2.083***		-1.806***
		(0.530)		(0.410)		(0.214)
Middle East & North Africa (MENA)		-2.1602***		-2.037*		-2.771***
		(0.7675)		(1.047)		(1.013)
North America (NA)		2.0571		1.089		-2.354
		(2.891)		(1.382)		(1.609)
South Asia (SA)		-2.0685***		-2.124***		-3.916***
		(0.713)		(0.429)		(0.568)
Sub-Saharan Africa (SSA)		-2.1495**		-1.081**		-1.501***
		(0.845)		(0.438)		(0.250)
Change in inequality (dGini)	2.6042***	2.8187***	2.536***	2.579***	3.4735***	3.607***
	(0.485)	(0.468)	(0.452)	(0.470)	(0.412)	(0.407)
Initial education index	-0.0202	-0.0561	-0.0769***	-0.0445*	-0.0331	-0.0576***
	(0.0573)	(0.053)	(0.0213)	(0.0255)	(0.0430)	(0.0180)
Constant	-0.0157	-0.0454	-0.0554***	-0.0415**	-0.0096	-0.0353***
	(0.0439)	(0.041)	(0.0166)	(0.0191)	(0.0292)	(0.0134)
Observations	463	463	509	509	499	509
R-squared	0.0787	0.1728	0.229	0.247	0.311	0.454

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1);

Notes: *Regional dummy variables are included in the models in the second, fourth, and sixth columns*

Regression Results for Control of Corruption (CC) Dimension of IQ

Dependent Variable: Δlog $1.90/day poverty headcount measure, Δloghc_19$_{it}$						
	Global Sample					
	PWT Growth Dataset		WDI Growth Dataset		PovcalNet Growth Data	
Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	IV-2SLS	IV-2SLS	OLS	OLS	IV-2SLS	OLS
Growth (in annualised log change)	-2.8435***		-2.611***		-3.5737***	
	(0.4872)		(0.363)		(0.316)	
Control of corruption (CC)	0.0536*	0.0703***	0.0423***	0.0339***	0.0548**	0.0338***
	(0.0285)	(0.0247)	(0.0111)	(0.0122)	(0.0232)	(0.00911)
Growth*CC	-3.1781***	-2.0190***	-1.076**	-0.980**	-2.6743***	-0.293
	(0.6754)	(0.606)	(0.441)	(0.489)	(0.743)	(0.238)
Growth * regional dummy variables						
East Asia and Pacific (EAP)		-3.1883***		-3.246***		-3.496***
		(0.527)		(0.519)		(0.336)
Europe & Central Asia (ECA)		-2.4652***		-2.935***		-3.256***
		(0.355)		(0.560)		(0.301)
Latin America & Caribbean (LAC)		-1.0863***		-2.101***		-1.876***
		(0.423)		(0.406)		(0.219)
Middle East & North Africa (MENA)		-1.8877***		-2.059**		-2.758***
		(0.618)		(1.042)		(1.018)
North America (NA)		0.9817		0.675		-2.534
		(2.746)		(1.391)		(1.585)
South Asia (SA)		-2.0516***		-2.180***		-3.880***
		(0.695)		(0.429)		(0.582)
Sub-Saharan Africa (SSA)		-1.7315***		-1.095**		-1.553***
		(0.649)		(0.425)		(0.229)
Change in inequality (dGini)	2.5028***	2.7451***	2.509***	2.561***	3.5539***	3.594***
	(0.5227)	(0.454)	(0.450)	(0.468)	(0.4300)	(0.403)
Initial education index	-0.0046	-0.0617	-0.0844***	-0.0480**	-0.0559	-0.0560***
	(0.0579)	(0.043)	(0.0183)	(0.0220)	(0.0382)	(0.0159)
Constant	-0.0013	-0.0505*	-0.0565***	-0.0414**	-0.0148	-0.0310**
	(0.0432)	(0.0304)	(0.0151)	(0.0172)	(0.0249)	(0.0127)
Observations	463	463	509	509	499	509
R-squared	-	0.214	0.231	0.251	0.263	0.459

Regression Results for Rule of Law (RL) Dimension of IQ

Dependent Variable: Δlog $1.90/day poverty headcount measure, Δloghc_19$_{it}$						
	Global Sample					
	PWT Growth Dataset		WDI Growth Dataset		PovcalNet Growth Data	
Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	IV-2SLS	IV-2SLS	OLS	OLS	IV-2SLS	OLS
Growth (in annualised log change)	-2.5541***		-2.605***		-3.2708***	
	(0.3765)		(0.347)		(0.246)	
Rule of law (RL)	0.0585**	0.0694***	0.0416***	0.0328**	0.0519**	0.0307***
	(0.0256)	(0.025)	(0.0114)	(0.0128)	(0.0228)	(0.00980)
Growth*RL	-2.7546***	-1.9783***	-1.208***	-1.041**	-2.4633***	-0.172
	(0.5088)	(0.589)	(0.417)	(0.472)	(0.668)	(0.247)
Growth * regional dummy variables						
East Asia and Pacific (EAP)		-2.9975***		-3.246***		-3.463***
		(0.478)		(0.493)		(0.334)
Europe & Central Asia (ECA)		-2.3677***		-2.875***		-3.229***
		(0.336)		(0.556)		(0.292)
Latin America & Caribbean (LAC)		-1.2464**		-2.112***		-1.779***
		(0.495)		(0.420)		(0.225)
Middle East & North Africa (MENA)		-1.9095***		-2.050*		-2.861***
		(0.612)		(1.052)		(1.016)
North America (NA)		1.034		0.874		-2.461
		(2.676)		(1.379)		(1.629)
South Asia (SA)		-1.7752***		-2.119***		-3.901***
		(0.645)		(0.425)		(0.574)
Sub-Saharan Africa (SSA)		-1.7468***		-1.155***		-1.468***
		(0.655)		(0.438)		(0.230)
Change in inequality (dGini)	2.601***	2.7353***	2.524***	2.578***	3.4637***	3.563***
	(0.4938)	(0.454)	(0.450)	(0.468)	(0.428)	(0.402)
Initial education index	-0.0234	-0.0614	-0.0793***	-0.0458*	-0.0537	-0.0550***
	(0.0496)	(0. .0454)	(0.0196)	(0.0237)	(0.0390)	(0.0169)
Constant	-0.0179	-0.0515	-0.0543***	-0.0406**	-0.0200	-0.0319**
	(0.0366)	(0.032)	(0.0155)	(0.0179)	(0.0250)	(0.0128)
Observations	463	463	509	509	499	509
R-squared	0.073	0.228	0.231	0.250	0.281	0.454

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second, fourth, and sixth columns*

Regression Results for Voice and Accountability (VA) Dimension of IQ

Dependent Variable: Δlog $1.90/day poverty headcount measure, $\Delta loghc\_19_{it}$						
	Global Sample					
	PWT Growth Dataset		**WDI Growth Dataset**		**PovcalNet Growth Data**	
Explanatory variables	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	IV-2SLS	IV-2SLS	OLS	OLS	IV-2SLS	OLS
Growth (in annualised log change)	-2.8273***		-2.316***		-2.9841***	
	(0.597)		(0.348)		(0.249)	
Voice & accountability (VA)	0.0331	0.0850**	0.0555***	0.0460***	0.0614	0.0352***
	(0. .054)	(0.0354)	(0.0138)	(0.0151)	(0.0404)	(0.0111)
Growth*VA	-3.5655***	-2.6567***	-0.787**	-0.669	-2.4982***	-0.176
	(0. .878)	(0.8245)	(0.354)	(0.438)	(0.700)	(0.225)
Growth * regional dummy variables						
East Asia and Pacific (EAP)		-3.4562***		-2.871***		-3.224***
		(0.7741)		(0.558)		(0.368)
Europe & Central Asia (ECA)		-2.1766***		-2.656***		-3.174***
		(0.3399)		(0.570)		(0.279)
Latin America & Caribbean (LAC)		-0.5749		-1.972***		-1.877***
		(0.3718)		(0.389)		(0.198)
Middle East & North Africa (MENA)		-2.7337***		-1.432		-2.381**
		(0.9272)		(1.005)		(0.954)
North America (NA)		1.5086		0.579		-2.133
		(2.833)		(1.307)		(1.603)
South Asia (SA)		-2.0206***		-1.936***		-3.568***
		(0.734)		(0.443)		(0.551)
Sub-Saharan Africa (SSA)		-2.2025***		-0.867**		-1.407***
		(0.8014)		(0.437)		(0.207)
Change in inequality (dGini)	2.422***	2.7462***	2.440***	2.474***	3.2896***	3.534***
	(0.610)	(0.5149)	(0.454)	(0.467)	(0.466)	(0.405)
Initial education index	0.0533	-0.0651	-0.103***	-0.0674***	-0.0566	-0.0569***
	(0.101)	(0.0558)	(0.0213)	(0.0257)	(0.0609)	(0.0177)
Constant	0.0397	-0.0550**	-0.0769***	-0.0606***	-0.0339	-0.0385***
	(0.0774)	(0.0410)	(0.0181)	(0.0204)	(0.0417)	(0.0141)
Observations	463	463	509	509	499	509
R-squared	-	0.137	0.236	0.254	0.194	0.456

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second, fourth, and sixth columns*

Appendix 4B: Chapter Three Regression Results for IQ Dimensions

Appendix 4B1: Regression Results for Sectoral Value-Added Growth & IQ
Sectoral Value-Added Growth and Regulatory Quality (RQ)

Dependent Variables: Δlog \$1.90/day (Δloghc_19$_{it}$) and Δlog \$3.20/day (Δloghc_32$_{it}$) poverty headcount measures						
	Δloghc_19$_{it}$ poverty headcount			Δloghc_32$_{it}$ poverty headcount		
	Global Sample		SSA	Global Sample		SSA
Explanatory variables	Column1	Column2	Column3	Column4	Column5	Column6
Agriculture value-added growth	-4.322*		-0.222	-1.035		-0.182
	(2.216)		(1.473)	(1.607)		(0.808)
Industry. value-added growth	-0.0181		0.376	-0.859		0.159
	(1.022)		(0.818)	(0.688)		(0.524)
Services value-added growth	-1.936*		-0.808	-0.995		-0.490
	(0.984)		(1.266)	(0.661)		(0.774)
Regulatory Quality (RQ)	0.105**	0.116**	0.0216	0.0615*	0.0674*	0.0172
	(0.0446)	(0.0473)	(0.0554)	(0.0346)	(0.0393)	(0.0313)
RQ*(Agriculture value-added growth)	-4.352	-3.089	0.281	-0.168	-0.566	0.0706
	(2.718)	(3.352)	(1.485)	(1.897)	(2.341)	(0.893)
RQ*(Industry. value-added growth)	-1.050	-1.445	0.837	-1.553	-1.010	0.241
	(1.267)	(1.364)	(1.368)	(0.952)	(1.063)	(0.831)
RQ*(Services value-added growth)	-2.364*	-2.802*	-1.205	-1.608	-1.856	-0.670
	(1.286)	(1.430)	(1.383)	(0.991)	(1.130)	(0.825)
Agric value-added growth x regional dummy variab						
East Asia and Pacific (EAP)		-15.32*			-6.138	
		(8.440)			(6.341)	
Europe & Central Asia (ECA)		-91.56***			-10.45*	
		(19.15)			(5.846)	
Latin America & Caribbean (LAC)		-0.812			2.749	
		(6.866)			(4.588)	
Middle East & North Africa (MENA)		-8.367			-5.890*	
		(6.402)			(3.318)	
South Asia (SA)		5.174			3.888**	
		(3.274)			(1.807)	
Sub-Saharan Africa (SSA)		-4.097			-1.720	
		(2.547)			(1.793)	
Indust value-added growth x regional dummy var.						
East Asia and Pacific (EAP)		2.473			1.317	
		(2.913)			(2.030)	
Europe & Central Asia (ECA)		-17.73***			8.339***	
		(2.315)			(1.053)	
Latin America & Caribbean (LAC)		1.079			-0.504	
		(1.931)			(1.510)	
Middle East & North Africa (MENA)		-0.184			0.249	
		(5.831)			(2.463)	
South Asia (SA)		6.471**			2.773*	
		(2.957)			(1.601)	
Sub-Saharan Africa (SSA)		-0.0477			-0.273	
		(0.951)			(0.728)	
Services value-added growth x regional dummy var.						
East Asia and Pacific (EAP)		-3.997			-2.557	
		(2.778)			(1.904)	
Europe & Central Asia (ECA)		18.09***			-8.764***	
		(2.231)			(0.862)	
Latin America & Caribbean (LAC)		-1.505			-1.163	
		(1.150)			(0.906)	
Middle East & North Africa (MENA)		-0.878			-0.201	
		(2.533)			(1.224)	
South Asia (SA)		-6.559***			-2.734**	
		(2.181)			(1.178)	
Sub-Saharan Africa (SSA)		-2.210*			-1.193	
		(1.128)			(0.822)	
Population growth	4.949***	3.515**	1.323	2.619***	2.326*	0.884**
	(1.511)	(1.718)	(1.294)	(0.958)	(1.182)	(0.411)
Change in Gini (dGini)	2.273***	2.643***	0.608	1.294***	1.583***	-0.0263
	(0.683)	(0.666)	(0.378)	(0.432)	(0.435)	(0.174)
Initial Gini (lnsGini)	0.0394	-0.0318	0.0122	-7.72e-05	-0.0100	-0.00868
	(0.0421)	(0.0609)	(0.0685)	(0.0285)	(0.0445)	(0.0299)
Initial life expectancy	-0.154**	-0.243**	-0.0819	-0.168***	-0.179***	-0.0563
	(0.0646)	(0.0952)	(0.0742)	(0.0415)	(0.0634)	(0.0399)
Constant	0.575**	0.917**	0.294	0.637***	0.681***	0.194
	(0.290)	(0.389)	(0.280)	(0.184)	(0.258)	(0.151)
Observations	162	162	42	162	162	42
R-squared	0.334	0.445	0.289	0.368	0.452	0.301

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fifth columns*

Sectoral Value-Added Growth and Control of Corruption (CC)

Dependent Variables: Δlog \$1.90/day (Δloghc_19$_{it}$) and Δlog \$3.20/day (Δloghc_32$_{it}$) poverty headcount measures						
	Δloghc_19$_{it}$ poverty headcount			Δloghc_32$_{it}$ poverty headcount		
	Global Sample		SSA	Global Sample		SSA
Explanatory variables	Column1	Column2	Column3	Column4	Column5	Column6
Agriculture value-added growth	-2.795		0.0786	-0.236		0.0894
	(2.332)		(1.300)	(1.663)		(0.863)
Industry. value-added growth	0.189		0.463	-1.166		0.126
	(1.161)		(0.804)	(0.868)		(0.569)
Services value-added growth	-2.813**		-0.0251	-1.308		-0.123
	(1.093)		(1.301)	(0.842)		(0.815)
Control of corruption (CC)	0.112***	0.118***	-0.00481	0.0527	0.0571	0.00355
	(0.0382)	(0.0446)	(0.0463)	(0.0342)	(0.0412)	(0.0277)
CC*(Agriculture value-added growth)	-2.362	0.507	0.795	0.665	1.483	0.498
	(3.367)	(4.484)	(1.896)	(2.347)	(3.128)	(1.225)
CC*(Industry. value-added growth)	-0.0705	-0.128	1.676	-1.376	-0.757	0.547
	(1.278)	(1.370)	(1.295)	(1.046)	(1.143)	(0.876)
CC*(Services value-added growth)	-2.688**	-3.209**	-0.0790	-1.336	-1.750	-0.137
	(1.147)	(1.453)	(1.253)	(0.952)	(1.173)	(0.806)
Agric value-added growth x regional dummy variab						
East Asia and Pacific (EAP)		-11.00			-3.618	
		(8.782)			(6.599)	
Europe & Central Asia (ECA)		-94.40***			-8.435	
		(19.02)			(7.094)	
Latin America & Caribbean (LAC)		0.216			2.956	
		(6.002)			(4.411)	
Middle East & North Africa (MENA)		-8.924			-6.043*	
		(6.594)			(3.406)	
South Asia (SA)		7.423**			5.100**	
		(3.735)			(2.210)	
Sub-Saharan Africa (SSA)		-1.441			-0.177	
		(2.844)			(1.956)	
Indust value-added growth x regional dummy var.						
East Asia and Pacific (EAP)		3.168			1.306	
		(2.983)			(2.116)	
Europe & Central Asia (ECA)		-17.91***			7.423***	
		(2.801)			(1.556)	
Latin America & Caribbean (LAC)		1.579			-0.542	
		(1.937)			(1.572)	
Middle East & North Africa (MENA)		-0.0318			0.107	
		(5.889)			(2.549)	
South Asia (SA)		7.835**			2.993*	
		(3.151)			(1.764)	
Sub-Saharan Africa (SSA)		-0.444			-0.733	
		(1.018)			(0.793)	
Services value-added growth x regional dummy var.						
East Asia and Pacific (EAP)		-5.609*			-3.353*	
		(2.865)			(2.012)	
Europe & Central Asia (ECA)		17.20***			-8.971***	
		(2.291)			(0.998)	
Latin America & Caribbean (LAC)		-2.553**			-1.602	
		(1.208)			(1.029)	
Middle East & North Africa (MENA)		-1.812			-0.621	
		(2.595)			(1.368)	
South Asia (SA)		-8.189***			-3.402**	
		(2.288)			(1.316)	
Sub-Saharan Africa (SSA)		-3.061**			-1.451	
		(1.363)			(1.056)	
Population growth	4.864***	3.507**	1.846	2.564***	2.190*	1.073**
	(1.499)	(1.691)	(1.539)	(0.971)	(1.162)	(0.514)
Change in Gini (dGini)	2.222***	2.518***	0.752*	1.270***	1.536***	0.0348
	(0.675)	(0.688)	(0.412)	(0.433)	(0.454)	(0.193)
Initial Gini (lnsGini)	0.0216	-0.0566	-0.0167	-0.00522	-0.0177	-0.0214
	(0.0428)	(0.0648)	(0.0681)	(0.0310)	(0.0482)	(0.0315)
Initial life expectancy	-0.173***	-0.267***	-0.145	-0.179***	-0.179***	-0.0835*
	(0.0649)	(0.0915)	(0.0892)	(0.0434)	(0.0626)	(0.0424)
Constant	0.673**	1.032***	0.496	0.693***	0.694***	0.281*
	(0.291)	(0.374)	(0.321)	(0.191)	(0.256)	(0.152)
Observations	162	162	42	162	162	42
R-squared	0.333	0.445	0.292	0.359	0.446	0.300

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

***Notes:** Regional dummy variables are included in the models in the second and fifth columns*

Sectoral Value-Added Growth and Government Effectiveness (GE)

Dependent Variables: Δlog \$1.90/day (Δloghc_19$_{it}$) and Δlog \$3.20/day (Δloghc_32$_{it}$) poverty headcount measures						
	Δloghc_19$_{it}$ poverty headcount			Δloghc_32$_{it}$ poverty headcount		
	Global Sample		SSA	Global Sample		SSA
Explanatory variables	Column1	Column2	Column3	Column4	Column5	Column6
Agriculture value-added growth	-6.295**		1.953	-2.227		0.951
	(2.913)		(1.646)	(1.879)		(1.079)
Industry. value-added growth	-0.266		-0.296	-0.920		-0.243
	(1.033)		(0.793)	(0.681)		(0.564)
Services value-added growth	-1.792		-0.870	-0.842		-0.580
	(1.101)		(1.498)	(0.733)		(0.986)
Government effectiveness (GE)	0.0800	0.0768	0.000487	0.0297	0.0273	0.0102
	(0.0518)	(0.0579)	(0.0636)	(0.0398)	(0.0465)	(0.0364)
GE*(Agriculture value-added growth)	-7.998*	-3.958	3.263	-2.473	-1.109	1.596
	(4.103)	(5.257)	(2.394)	(2.572)	(3.328)	(1.562)
GE*(Industry. value-added growth)	-0.617	-0.322	0.185	-1.057	-0.397	-0.249
	(1.488)	(1.487)	(1.374)	(1.047)	(1.193)	(0.768)
GE*(Services value-added growth)	-2.601	-2.972	-1.415	-1.206	-1.542	-0.861
	(1.638)	(1.840)	(1.837)	(1.191)	(1.389)	(1.172)
Agric value-added growth x regional dummy variab						
East Asia and Pacific (EAP)		-16.53*			-7.568	
		(8.653)			(6.613)	
Europe & Central Asia (ECA)		-91.81***			-10.30	
		(20.09)			(6.653)	
Latin America & Caribbean (LAC)		-2.642			1.173	
		(5.566)			(4.162)	
Middle East & North Africa (MENA)		-10.54			-7.604*	
		(7.059)			(4.106)	
South Asia (SA)		4.432			3.722*	
		(3.796)			(2.188)	
Sub-Saharan Africa (SSA)		-4.001			-1.612	
		(3.690)			(2.377)	
Indust value-added growth x regional dummy var.						
East Asia and Pacific (EAP)		2.601			1.279	
		(2.675)			(1.829)	
Europe & Central Asia (ECA)		-18.37***			7.919***	
		(2.441)			(1.161)	
Latin America & Caribbean (LAC)		-0.348			-1.438	
		(1.826)			(1.496)	
Middle East & North Africa (MENA)		-0.390			0.167	
		(5.963)			(2.569)	
South Asia (SA)		7.509***			3.460**	
		(2.823)			(1.543)	
Sub-Saharan Africa (SSA)		-0.0849			-0.395	
		(1.148)			(0.802)	
Services value-added growth x regional dummy var.						
East Asia and Pacific (EAP)		-4.092			-2.427	
		(2.695)			(1.795)	
Europe & Central Asia (ECA)		18.28***			-8.635***	
		(2.293)			(0.904)	
Latin America & Caribbean (LAC)		-1.550			-1.229	
		(1.189)			(0.945)	
Middle East & North Africa (MENA)		-0.463			0.145	
		(2.738)			(1.409)	
South Asia (SA)		-7.291***			-3.265***	
		(2.181)			(1.208)	
Sub-Saharan Africa (SSA)		-2.071			-0.971	
		(1.299)			(0.931)	
Population growth	4.578***	2.912	-0.0432	2.212**	1.768	0.202
	(1.551)	(1.844)	(1.732)	(1.011)	(1.308)	(0.700)
Change in Gini (dGini)	2.445***	2.690***	0.726*	1.383***	1.638***	0.00658
	(0.689)	(0.692)	(0.409)	(0.438)	(0.443)	(0.185)
Initial Gini (lnsGini)	0.0647	0.0122	0.0272	0.00825	0.0200	-0.00223
	(0.0439)	(0.0625)	(0.0634)	(0.0294)	(0.0437)	(0.0279)
Initial life expectancy	-0.0887	-0.148	-0.0482	-0.133***	-0.106*	-0.0379
	(0.0651)	(0.0905)	(0.0752)	(0.0392)	(0.0577)	(0.0350)
Constant	0.331	0.571	0.197	0.503***	0.414*	0.140
	(0.288)	(0.372)	(0.280)	(0.171)	(0.237)	(0.132)
Observations	162	162	42	162	162	42
R-squared	0.346	0.443	0.314	0.374	0.453	0.331

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fifth columns*

Sectoral Value-Added Growth and Rule of Law (RL)

Dependent Variables: Δlog $1.90/day (Δloghc_19$_{it}$) and Δlog $3.20/day (Δloghc_32$_{it}$) poverty headcount measures						
	Δloghc_19$_{it}$ poverty headcount			**Δloghc_32$_{it}$ poverty headcount**		
	Global Sample		SSA	Global Sample		SSA
Explanatory variables	Column1	Column2	Column3	Column4	Column5	Column6
Agriculture value-added growth	-5.600**		-0.945	-1.851		-0.583
	(2.649)		(2.166)	(1.841)		(1.068)
Industry. value-added growth	-0.672		0.722	-1.415*		0.252
	(1.052)		(1.033)	(0.733)		(0.659)
Services value-added growth	-2.230**		-0.811	-1.017		-0.619
	(1.121)		(1.329)	(0.783)		(0.818)
Rule of law (RL)	0.0877**	0.0970**	0.0416	0.0381	0.0469	0.0319
	(0.0394)	(0.0417)	(0.0533)	(0.0327)	(0.0349)	(0.0277)
RL*(Agriculture value-added growth)	-5.513*	-4.280	-1.377	-1.207	-0.946	-0.751
	(2.939)	(3.593)	(2.128)	(1.978)	(2.700)	(1.134)
RL*(Industry. value-added growth)	-1.732	-2.260*	1.398	-2.085**	-2.274**	0.289
	(1.303)	(1.280)	(1.717)	(1.017)	(1.099)	(1.008)
RL*(Services value-added growth)	-1.890*	-2.338*	-0.937	-0.835	-1.288	-0.672
	(1.142)	(1.283)	(1.258)	(0.864)	(0.966)	(0.751)
Agric value-added growth x regional dummy variab						
East Asia and Pacific (EAP)		-16.23*			-6.833	
		(8.734)			(6.701)	
Europe & Central Asia (ECA)		-92.95***			-10.10*	
		(19.79)			(6.070)	
Latin America & Caribbean (LAC)		-3.774			1.761	
		(6.416)			(4.591)	
Middle East & North Africa (MENA)		-8.146			-5.963	
		(6.794)			(3.628)	
South Asia (SA)		3.393			2.824	
		(3.879)			(2.438)	
Sub-Saharan Africa (SSA)		-5.226*			-2.136	
		(3.028)			(2.167)	
Indust value-added growth x regional dummy var.						
East Asia and Pacific (EAP)		2.005			0.560	
		(2.759)			(1.917)	
Europe & Central Asia (ECA)		-17.44***			8.529***	
		(2.285)			(1.010)	
Latin America & Caribbean (LAC)		-0.258			-2.006	
		(1.984)			(1.569)	
Middle East & North Africa (MENA)		0.217			0.734	
		(5.560)			(2.279)	
South Asia (SA)		6.216*			2.061	
		(3.192)			(2.027)	
Sub-Saharan Africa (SSA)		-0.548			-0.903	
		(0.917)			(0.808)	
Services value-added growth x regional dummy var.						
East Asia and Pacific (EAP)		-4.847*			-2.929	
		(2.770)			(1.889)	
Europe & Central Asia (ECA)		16.91***			-9.546***	
		(2.234)			(0.849)	
Latin America & Caribbean (LAC)		-2.092*			-1.495*	
		(1.174)			(0.900)	
Middle East & North Africa (MENA)		-1.860			-0.788	
		(2.544)			(1.279)	
South Asia (SA)		-6.756***			-2.574*	
		(2.465)			(1.509)	
Sub-Saharan Africa (SSA)		-2.450*			-1.097	
		(1.253)			(0.914)	
Population growth	5.041***	3.676**	2.443*	2.533**	2.193*	1.419**
	(1.576)	(1.824)	(1.329)	(1.003)	(1.258)	(0.581)
Change in Gini (dGini)	2.495***	2.798***	0.512	1.401***	1.681***	-0.0701
	(0.678)	(0.675)	(0.377)	(0.427)	(0.428)	(0.181)
Initial Gini (lnsGini)	0.0561	0.00793	0.00148	3.49e-05	0.0144	-0.0125
	(0.0420)	(0.0625)	(0.0745)	(0.0270)	(0.0434)	(0.0327)
Initial life expectancy	-0.117*	-0.152*	-0.111	-0.161***	-0.110*	-0.0670
	(0.0646)	(0.0894)	(0.0774)	(0.0415)	(0.0584)	(0.0396)
Constant	0.452	0.594	0.382	0.616***	0.429*	0.228
	(0.289)	(0.367)	(0.288)	(0.183)	(0.240)	(0.145)
Observations	162	162	42	162	162	42
R-squared	0.333	0.447	0.293	0.368	0.464	0.310

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fifth columns*

Sectoral Value-Added Growth and Voice and Accountability (VA)

Dependent Variables: Δlog \$1.90/day ($\Delta loghc\_19_{it}$) and Δlog \$3.20/day ($\Delta loghc\_32_{it}$) poverty headcount measures						
	$\Delta loghc\_19_{it}$ poverty headcount			**$\Delta loghc\_32_{it}$ poverty headcount**		
	Global Sample		SSA	Global Sample		SSA
Explanatory variables	Column1	Column2	Column3	Column4	Column5	Column6
Agriculture value-added growth	-4.181**		-1.410	-1.175		-0.628
	(1.740)		(1.472)	(1.297)		(0.848)
Industry. value-added growth	0.396		0.291	-0.601		0.0779
	(0.973)		(0.790)	(0.688)		(0.473)
Services value-added growth	-1.924**		-0.703	-1.201**		-0.508
	(0.806)		(1.025)	(0.593)		(0.613)
Voice & accountability (VA)	0.117***	0.127***	0.0438	0.0740**	0.0840**	0.0278
	(0.0404)	(0.0459)	(0.0520)	(0.0304)	(0.0350)	(0.0280)
VA*(Agriculture value-added growth)	-4.362**	-3.887*	-0.810	-1.206	-1.700	-0.206
	(1.782)	(2.199)	(1.375)	(1.170)	(1.463)	(0.842)
VA*(Industry. value-added growth)	-0.921	-2.219*	0.957	-1.062*	-1.564*	0.220
	(0.878)	(1.305)	(1.072)	(0.575)	(0.944)	(0.633)
VA*(Services value-added growth)	-1.112	-1.231	-1.517	-0.940	-1.100	-0.942
	(1.359)	(1.423)	(1.496)	(0.851)	(0.961)	(0.809)
Agric value-added growth x regional dummy variab						
East Asia and Pacific (EAP)		-8.506			-1.340	
		(8.010)			(6.082)	
Europe & Central Asia (ECA)		-90.59***			-9.445*	
		(17.88)			(5.211)	
Latin America & Caribbean (LAC)		-4.494			0.626	
		(8.181)			(5.837)	
Middle East & North Africa (MENA)		-6.022			-4.005*	
		(4.826)			(2.060)	
South Asia (SA)		3.380			2.898	
		(3.462)			(2.124)	
Sub-Saharan Africa (SSA)		-4.473*			-2.410	
		(2.395)			(1.554)	
Indust value-added growth x regional dummy var.						
East Asia and Pacific (EAP)		0.615			-0.142	
		(3.371)			(2.481)	
Europe & Central Asia (ECA)		-18.71***			7.830***	
		(2.137)			(1.023)	
Latin America & Caribbean (LAC)		3.947*			1.285	
		(2.200)			(1.627)	
Middle East & North Africa (MENA)		-2.006			-0.958	
		(4.465)			(1.840)	
South Asia (SA)		5.941**			2.785**	
		(2.658)			(1.325)	
Sub-Saharan Africa (SSA)		-0.808			-0.691	
		(1.182)			(0.761)	
Services value-added growth x regional dummy var.						
East Asia and Pacific (EAP)		-3.606			-2.437	
		(2.684)			(2.012)	
Europe & Central Asia (ECA)		18.57***			-8.725***	
		(2.052)			(0.847)	
Latin America & Caribbean (LAC)		-2.662**			-1.938**	
		(1.229)			(0.919)	
Middle East & North Africa (MENA)		-0.202			0.0101	
		(2.047)			(0.993)	
South Asia (SA)		-6.025***			-2.682**	
		(2.103)			(1.133)	
Sub-Saharan Africa (SSA)		-1.945**			-1.173*	
		(0.946)			(0.631)	
Population growth	4.986***	4.140**	1.844	2.817***	2.847***	0.974*
	(1.415)	(1.635)	(1.383)	(0.899)	(1.052)	(0.540)
Change in Gini (dGini)	1.838***	2.129***	0.569	0.938**	1.238***	-0.0396
	(0.642)	(0.655)	(0.369)	(0.418)	(0.445)	(0.183)
Initial Gini (lnsGini)	-0.0554	-0.107	-0.0130	-0.0595*	-0.0597	-0.0177
	(0.0466)	(0.0680)	(0.0638)	(0.0354)	(0.0512)	(0.0283)
Initial life expectancy	-0.221***	-0.291***	-0.123	-0.220***	-0.217***	-0.0736*
	(0.0680)	(0.102)	(0.0761)	(0.0456)	(0.0688)	(0.0388)
Constant	0.780***	1.052**	0.433	0.809***	0.799***	0.258
	(0.292)	(0.410)	(0.303)	(0.193)	(0.274)	(0.154)
Observations	162	162	42	162	162	42
R-squared	0.389	0.480	0.291	0.400	0.481	0.320

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fifth columns*

Appendix 4B2: Regression Results for Sectoral Labour Productivity Growth (LPG)
Labour Productivity Growth and Regulatory Quality (RQ)

Dependent Variables: Δlog \$1.90/day ($\Delta loghc\_19_{it}$) and Δlog \$3.20/day ($\Delta loghc\_32_{it}$) poverty headcount measures						
	$\Delta loghc\_19_{it}$ poverty headcount			**$\Delta loghc\_32_{it}$ poverty headcount**		
	Global Sample		SSA	Global Sample		SSA
Explanatory variables	Column1	Column2	Column3	Column4	Column5	Column6
Agriculture Labour Productivity growth	-4.514		0.491	-0.930		0.356
	(2.902)		(1.608)	(2.091)		(0.941)
Industry Labour Productivity growth	0.968		-0.254	-0.375		-0.338
	(1.242)		(1.179)	(0.853)		(0.587)
Services Labour Productivity growth	-2.257**		-0.720	-1.078*		0.0558
	(1.001)		(1.142)	(0.589)		(0.556)
Agriculture Labour force expansion	-7.024**	-4.990	-0.655	-2.565	-1.865	-0.603
	(2.970)	(3.168)	(2.027)	(2.009)	(1.884)	(1.078)
Industry Labour force expansion	-1.700	-0.734	-0.246	-1.297	-0.687	-0.0979
	(1.308)	(1.422)	(0.666)	(0.811)	(0.992)	(0.421)
Services Labour force expansion	-1.480	-2.565*	-0.958	-1.247*	-1.926**	-0.510
	(1.104)	(1.304)	(0.691)	(0.709)	(0.812)	(0.333)
Regulatory Quality (RQ)	0.0322	0.0218	-0.0210	0.00968	-0.000980	-0.0161
	(0.0263)	(0.0260)	(0.0313)	(0.0200)	(0.0201)	(0.0154)
RQ*(Agriculture Labour Productivity growth)	-5.734*	-5.363	0.598	-1.525	-1.039	0.644
	(3.452)	(3.749)	(2.093)	(2.403)	(2.464)	(1.156)
RQ*(Industry Labour Productivity growth)	1.325	1.658	0.964	0.353	0.951	-0.0639
	(1.377)	(1.625)	(1.753)	(1.072)	(1.199)	(0.867)
RQ*(Services Labour Productivity growth)	-1.668	-2.268*	-2.788	-1.434	-1.528*	-0.588
	(1.344)	(1.348)	(1.781)	(0.884)	(0.906)	(0.865)
Agric Lab Product. growth x regional dummy variab						
East Asia and Pacific (EAP)		-19.16*			-9.979	
		(9.752)			(6.905)	
Europe & Central Asia (ECA)		84.67**			12.39	
		(40.04)			(11.63)	
Latin America & Caribbean (LAC)		-1.676			-3.320	
		(6.183)			(4.460)	
Middle East & North Africa (MENA)		-4.794			-4.875	
		(9.282)			(5.058)	
South Asia (SA)		-0.120			2.670	
		(3.676)			(2.097)	
Sub-Saharan Africa (SSA)		-3.148			-0.109	
		(2.964)			(1.963)	
Indust. Lab Product. growth x regional dummy var.						
East Asia and Pacific (EAP)		4.071			1.948	
		(2.496)			(1.681)	
Europe & Central Asia (ECA)		-4.977			-20.19***	
		(14.18)			(4.751)	
Latin America & Caribbean (LAC)		3.200**			1.332	
		(1.406)			(1.226)	
Middle East & North Africa (MENA)		1.442			0.166	
		(7.877)			(3.961)	
South Asia (SA)		4.826			1.556	
		(4.993)			(2.793)	
Sub-Saharan Africa (SSA)		-0.772			-1.054	
		(1.194)			(0.861)	
Services Lab Product. growth x regional dummy var.						
East Asia and Pacific (EAP)		-3.024			-1.505	
		(2.971)			(1.762)	
Europe & Central Asia (ECA)		-10.39			27.22***	
		(18.70)			(4.299)	
Latin America & Caribbean (LAC)		-0.906			-0.957	
		(0.986)			(0.751)	
Middle East & North Africa (MENA)		-3.858			-1.014	
		(5.266)			(2.764)	
South Asia (SA)		-5.335*			-2.321	
		(2.910)			(1.634)	
Sub-Saharan Africa (SSA)		-1.732			-0.956	
		(1.194)			(0.833)	
Change in Gini (dGini)	2.294***	2.455***	1.111**	1.396***	1.473***	0.252
	(0.725)	(0.796)	(0.471)	(0.456)	(0.528)	(0.206)
Initial Gini (lnsGini)	0.0269	-0.00822	0.0443	0.00358	0.00134	0.000766
	(0.0462)	(0.0493)	(0.0574)	(0.0317)	(0.0352)	(0.0274)
Initial life expectancy	-0.251***	-0.229***	-0.0391	-0.224***	-0.187***	-0.0428
	(0.0419)	(0.0658)	(0.0663)	(0.0276)	(0.0486)	(0.0348)
Constant	1.023***	0.920***	0.173	0.905***	0.762***	0.158
	(0.177)	(0.277)	(0.263)	(0.116)	(0.205)	(0.127)
Observations	162	162	42	162	162	42
R-squared	0.329	0.444	0.403	0.355	0.448	0.374

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fifth columns*

Labour Productivity Growth and Control of Corruption (CC)

Dependent Variables: Δlog $1.90/day ($\Delta loghc_19_{it}$) and Δlog $3.20/day ($\Delta loghc_32_{it}$) poverty headcount measures						
	$\Delta loghc\_19_{it}$ poverty headcount			**$\Delta loghc\_32_{it}$ poverty headcount**		
	Global Sample		SSA	Global Sample		SSA
Explanatory variables	Column1	Column2	Column3	Column4	Column5	Column6
Agriculture Labour Productivity growth	-2.404		0.386	-0.0457		0.711
	(2.685)		(2.018)	(2.035)		(1.123)
Industry Labour Productivity growth	1.096		-0.227	-0.251		-0.523
	(1.452)		(1.348)	(1.047)		(0.696)
Services Labour Productivity growth	-2.838**		-0.585	-1.407*		0.271
	(1.116)		(1.333)	(0.750)		(0.651)
Agriculture Labour force expansion	-5.026*	-2.287	-0.541	-1.661	-0.614	-0.642
	(2.968)	(3.130)	(2.115)	(2.069)	(1.948)	(1.070)
Industry Labour force expansion	-1.789	-0.706	0.0894	-1.195	-0.533	-0.0815
	(1.283)	(1.404)	(0.803)	(0.806)	(0.997)	(0.524)
Services Labour force expansion	-1.553	-2.679**	-0.661	-1.350*	-2.001**	-0.265
	(1.068)	(1.267)	(0.746)	(0.711)	(0.843)	(0.403)
Control of corruption (CC)	0.0408*	0.0349	-0.000764	0.0129	0.00764	-0.0112
	(0.0238)	(0.0242)	(0.0318)	(0.0199)	(0.0211)	(0.0161)
CC*(Agriculture Labour Productivity growth)	-2.215	-2.375	0.235	-0.299	0.0142	1.091
	(3.383)	(3.713)	(2.567)	(2.471)	(2.639)	(1.406)
CC*(Industry Labour Productivity growth)	0.693	1.477	0.399	0.210	0.923	-0.536
	(1.412)	(1.524)	(2.142)	(1.124)	(1.171)	(1.088)
CC*(Services Labour Productivity growth)	-1.442	-2.285*	-1.803	-1.065	-1.368	-0.129
	(1.219)	(1.209)	(1.666)	(0.862)	(0.886)	(0.860)
Agric Lab Product. growth x regional dummy variab						
East Asia and Pacific (EAP)		-16.08*			-8.107	
		(9.679)			(6.885)	
Europe & Central Asia (ECA)		93.32**			16.07	
		(37.75)			(12.87)	
Latin America & Caribbean (LAC)		1.659			-1.226	
		(6.254)			(4.416)	
Middle East & North Africa (MENA)		-4.190			-4.385	
		(9.272)			(5.007)	
South Asia (SA)		2.253			3.940*	
		(3.802)			(2.329)	
Sub-Saharan Africa (SSA)		-0.884			0.777	
		(2.886)			(1.989)	
Indust. Lab Product. growth x regional dummy var.						
East Asia and Pacific (EAP)		4.283			2.237	
		(2.614)			(1.791)	
Europe & Central Asia (ECA)		-6.855			-20.70***	
		(13.37)			(5.091)	
Latin America & Caribbean (LAC)		3.797**			1.660	
		(1.494)			(1.380)	
Middle East & North Africa (MENA)		1.316			0.196	
		(7.902)			(3.997)	
South Asia (SA)		7.025			2.782	
		(4.860)			(2.864)	
Sub-Saharan Africa (SSA)		-0.723			-1.031	
		(1.272)			(0.969)	
Services Lab Product. growth x regional dummy var.						
East Asia and Pacific (EAP)		-3.836			-2.028	
		(2.957)			(1.767)	
Europe & Central Asia (ECA)		-8.269			27.79***	
		(17.43)			(4.597)	
Latin America & Caribbean (LAC)		-1.843			-1.470	
		(1.162)			(0.933)	
Middle East & North Africa (MENA)		-4.432			-1.212	
		(5.412)			(2.879)	
South Asia (SA)		-6.944**			-3.043	
		(3.048)			(1.839)	
Sub-Saharan Africa (SSA)		-2.168			-1.154	
		(1.350)			(0.995)	
Change in Gini (dGini)	2.308***	2.472***	0.963**	1.416***	1.508***	0.200
	(0.690)	(0.774)	(0.458)	(0.449)	(0.530)	(0.211)
Initial Gini (lnsGini)	-0.000599	-0.0385	0.0142	-0.00677	-0.0116	-0.00463
	(0.0475)	(0.0493)	(0.0660)	(0.0344)	(0.0377)	(0.0343)
Initial life expectancy	-0.288***	-0.277***	-0.103	-0.241***	-0.219***	-0.0632
	(0.0469)	(0.0727)	(0.0911)	(0.0309)	(0.0547)	(0.0437)
Constant	1.171***	1.107***	0.400	0.974***	0.887***	0.228
	(0.202)	(0.307)	(0.367)	(0.132)	(0.232)	(0.162)
Observations	162	162	42	162	162	42
R-squared	0.326	0.441	0.311	0.350	0.442	0.335

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fifth columns*

Labour Productivity Growth and Government Effectiveness (GE)

Dependent Variables: Δlog \$1.90/day ($\Delta loghc\_19_{it}$) and Δlog \$3.20/day ($\Delta loghc\_32_{it}$) poverty headcount measures						
	$\Delta loghc\_19_{it}$ poverty headcount			**$\Delta loghc\_32_{it}$ poverty headcount**		
	Global Sample		SSA	Global Sample		SSA
Explanatory variables	Column1	Column2	Column3	Column4	Column5	Column6
Agriculture Labour Productivity growth	-8.059*		3.601*	-2.650		2.179**
	(4.148)		(1.839)	(2.756)		(0.882)
Industry Labour Productivity growth	1.884		-0.585	0.376		-0.663
	(1.147)		(1.161)	(0.749)		(0.577)
Services Labour Productivity growth	-1.536		-0.144	-0.615		0.423
	(1.047)		(1.010)	(0.624)		(0.491)
Agriculture Labour force expansion	-6.493**	-3.165	0.904	-2.021	-0.480	0.0747
	(2.605)	(2.911)	(2.055)	(1.791)	(1.677)	(0.990)
Industry Labour force expansion	-2.511**	-1.225	-0.424	-1.574*	-0.894	-0.175
	(1.179)	(1.470)	(0.565)	(0.802)	(1.028)	(0.403)
Services Labour force expansion	-1.506	-2.180**	-0.717	-1.383**	-1.714***	-0.381
	(0.970)	(1.042)	(0.618)	(0.596)	(0.619)	(0.331)
Govt. effectiveness (GE)	-0.0123	-0.0280	-0.0415*	-0.0230	-0.0378	-0.0272**
	(0.0338)	(0.0379)	(0.0222)	(0.0251)	(0.0287)	(0.0103)
GE*(Agriculture Labour Productivity growth)	-11.42*	-5.016	4.088*	-4.289	0.349	2.722**
	(6.535)	(7.558)	(2.329)	(4.204)	(4.854)	(1.180)
GE*(Industry Labour Productivity growth)	4.610**	4.680**	1.714	2.921**	3.177**	-0.0194
	(1.991)	(2.064)	(2.123)	(1.408)	(1.459)	(0.993)
GE*(Services Labour Productivity growth)	-1.499	-1.538	-2.028	-0.682	-0.828	-0.169
	(1.487)	(1.482)	(1.390)	(0.876)	(0.961)	(0.645)
Agric Lab Product. growth x regional dummy variab						
East Asia and Pacific (EAP)		-19.10**			-10.09	
		(9.195)			(6.163)	
Europe & Central Asia (ECA)		84.24**			12.49	
		(37.58)			(11.16)	
Latin America & Caribbean (LAC)		-4.041			-4.345	
		(6.148)			(4.191)	
Middle East & North Africa (MENA)		-8.225			-7.420	
		(8.621)			(4.914)	
South Asia (SA)		-0.452			3.097	
		(4.851)			(3.026)	
Sub-Saharan Africa (SSA)		-2.714			0.939	
		(5.258)			(3.357)	
Indust. Lab Product. growth x regional dummy var.						
East Asia and Pacific (EAP)		4.256*			2.221	
		(2.194)			(1.412)	
Europe & Central Asia (ECA)		-5.198			-20.52***	
		(13.19)			(4.258)	
Latin America & Caribbean (LAC)		2.686**			0.861	
		(1.243)			(1.166)	
Middle East & North Africa (MENA)		0.909			0.144	
		(7.151)			(3.667)	
South Asia (SA)		7.686*			3.313	
		(4.614)			(2.561)	
Sub-Saharan Africa (SSA)		0.689			-0.331	
		(1.608)			(1.048)	
Services Lab Product. growth x regional dummy var.						
East Asia and Pacific (EAP)		-2.280			-1.007	
		(2.705)			(1.565)	
Europe & Central Asia (ECA)		-9.875			27.78***	
		(17.39)			(3.969)	
Latin America & Caribbean (LAC)		-0.885			-1.043	
		(1.081)			(0.808)	
Middle East & North Africa (MENA)		-1.295			0.810	
		(5.034)			(2.754)	
South Asia (SA)		-6.051**			-2.726*	
		(2.788)			(1.505)	
Sub-Saharan Africa (SSA)		-0.556			-0.0351	
		(1.380)			(0.984)	
Change in Gini (dGini)	2.481***	2.552***	1.145**	1.461***	1.493***	0.246
	(0.653)	(0.735)	(0.433)	(0.408)	(0.476)	(0.196)
Initial Gini (lnsGini)	0.0671	0.0284	0.0725	0.0223	0.0203	0.0152
	(0.0448)	(0.0459)	(0.0571)	(0.0306)	(0.0326)	(0.0280)
Initial life expectancy	-0.182***	-0.144***	0.00374	-0.184***	-0.125***	-0.0174
	(0.0453)	(0.0502)	(0.0578)	(0.0283)	(0.0357)	(0.0342)
Constant	0.769***	0.589***	0.00814	0.752***	0.511***	0.0577
	(0.188)	(0.207)	(0.227)	(0.116)	(0.148)	(0.124)
Observations	162	162	42	162	162	42
R-squared	0.386	0.471	0.467	0.401	0.488	0.470

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fifth columns*

Appendix 4B3: Regression Results for Structural Change & Productivity Growth for Voice and Accountability (VA) Dimension of IQ

Dependent Variables: Δlog $1.90/day (Δloghc_19$_{it}$) and Δlog $3.20/day (Δloghc_32$_{it}$) poverty headcount measures						
	Δlog $1.90/day poverty headcount			**Δlog $3.20/day poverty headcount**		
	Global Sample		SSA	Global Sample		SSA
Explanatory variables	Column1	Column2	Column3	Column4	Column5	Column6
Structural change	-0.678		0.484	-0.697		0.293
	(0.761)		(0.590)	(0.521)		(0.313)
Productivity growth	-0.860*		-0.0775	-0.699**		0.0529
	(0.437)		(0.476)	(0.283)		(0.197)
Voice & accountability (VA)	0.0615**	0.0692***	-0.0123	0.0367**	0.0384**	-0.00973
	(0.0238)	(0.0250)	(0.0284)	(0.0173)	(0.0186)	(0.0120)
VA*(Structural change)	-0.555	-2.492**	0.355	-0.424	-1.249	0.253
	(0.829)	(1.140)	(0.887)	(0.579)	(0.787)	(0.390)
VA*(Productivity growth)	-0.422	-0.196	-0.279	-0.484	-0.392	-0.0567
	(0.548)	(0.647)	(0.687)	(0.318)	(0.445)	(0.288)
Structural change x regional dummy variables						
East Asia and Pacific (EAP)		-5.651***			-3.211***	
		(1.648)			(1.126)	
Europe & Central Asia (ECA)		-1.670			-5.684***	
		(3.237)			(1.804)	
Latin America & Caribbean (LAC)		1.885			-0.0940	
		(1.892)			(1.401)	
Middle East & North Africa (MENA)		5.519			2.947	
		(12.17)			(5.858)	
South Asia (SA)		-1.042			0.180	
		(0.982)			(0.755)	
Sub-Saharan Africa (SSA)		-1.362			-0.733	
		(0.983)			(0.587)	
Productivity growth x regional dummy variables						
East Asia and Pacific (EAP)		0.0578			-0.248	
		(0.879)			(0.672)	
Europe & Central Asia (ECA)		3.487			0.779	
		(2.188)			(1.019)	
Latin America & Caribbean (LAC)		-0.447			-0.697	
		(0.920)			(0.685)	
Middle East & North Africa (MENA)		-2.817			-1.722	
		(4.295)			(2.167)	
South Asia (SA)		-0.951*			-0.291	
		(0.546)			(0.356)	
Sub-Saharan Africa (SSA)		-0.892			-0.699*	
		(0.659)			(0.390)	
Growth rate of labour employed in population	-2.148**	-2.365**	-0.766	-1.636**	-1.620**	-0.562*
	(0.953)	(0.996)	(0.502)	(0.700)	(0.782)	(0.282)
Change in Gini (dGini)	2.283***	2.280***	0.819	1.190***	1.168**	0.0831
	(0.689)	(0.683)	(0.510)	(0.424)	(0.451)	(0.231)
Initial Gini (lnsGini)	-0.0343	-0.0845	0.0187	-0.0470	-0.0550	0.000428
	(0.0502)	(0.0615)	(0.0642)	(0.0358)	(0.0430)	(0.0268)
Initial life expectancy	-0.299***	-0.280***	-0.0972	-0.261***	-0.227***	-0.0527
	(0.0580)	(0.0801)	(0.0718)	(0.0358)	(0.0515)	(0.0349)
Constant	1.178***	1.054***	0.363	1.019***	0.867***	0.188
	(0.228)	(0.316)	(0.286)	(0.141)	(0.205)	(0.128)
Observations	162	162	42	162	162	42
R-squared	0.346	0.423	0.278	0.381	0.432	0.363

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Notes: *Regional dummy variables are included in the models in the second and fifth columns*

Appendix Five: Cross-Cutting Appendices

Appendix 5A: Data Sources and Definition of Key Variables

Concept	Variable definition & Measurement	Data Source(s)	Variable Type
Aggregate Economic growth	Growth rate of GDP per capita (as measured in PPP constant 2015 international $)	WDI[5] database PWT[6] database	Independent variable
	National Survey Mean Income or Consumption	World Bank Poverty and Inequality Platform (or PovcalNet) Database	Independent variable
	Growth rate of gross value added at constant 2015 prices (millions, local currency)	Groningen Growth and Development Centre (GGDC) database	Independent variable
Labour Productivity	Growth rate of aggregate labour productivity (constant 2015 prices)	Computed using GGDC database	Independent variable
Sectoral Value-Added Economic Growth	Agricultural value added at constant 2015 prices (millions, local currency) in per capita growth	GGDC database	Independent variable
	Manufacturing and industry value added at constant 2015 prices (millions, local currency) in per capita growth	GGDC database	Independent variable
	Services value added at constant 2015 prices (millions, local currency) in per capita growth.	GGDC database	Independent variable
Sectoral Labour Productivity Growth	Agricultural value-added per worker (as measured in constant 2015 prices)	Computed using GGDC database	Independent variable
	Industry/manufacturing value-added per worker (as measured in constant 2015 prices)	Computed using GGDC database	Independent variable
	Services value-added per worker (as measured in constant 2015 prices)	Computed using GGDC database	Independent variable
Employment data	Total number of persons engaged across sectors (in thousands)	GGDC database	Independent variable
	Number of persons engaged in the agricultural sector (in thousands)	GGDC database	Independent variable
	Number of persons engaged in the manufacturing and industry sector (in thousands)	GGDC database	Independent variable
	Number of persons engaged in the services sector (in thousands)	GGDC database	Independent variable
Structural transformation/ change	Computation based on the sum of changes in sectoral employment shares in total employment weighted by sectoral labour productivity	Computed based on GGDC data	Independent variable
Within sector productivity growth	Computation based on the sum of changes in productivity growth within individual sectors, where the weights are the employment share of each sector at the beginning of the period in total employment.	Computed based on GGDC data	Independent variable

[5] *Word Bank World Development Indicator (WDI)*
[6] *Penn World Table (PWT)*

Sectoral employment shares	Share of employment in agriculture (proportion or % of total employment)	Computed based on GGDC data	For independent variable
	Share of employment in industry/ manufac. (proportion or % of total employment)	Computed based on GGDC data	For independent variable
	Share of employment in services (proportion or % of total employment)	Computed based on GGDC data	For independent variable
Improvement-driven motivated opportunity-based entrepreneurial activity (IOEA).	Percentage of those involved in TEA forming/setting up a business or owning–managing a young firm (up to 3.5 years old), who through improvement-driven motivation, (i) claim to be driven by opportunity as opposed to finding no other option for work; and (ii) who indicate the main driver for being involved in this opportunity is being independent or increasing their income/wealth, rather than just maintaining their income.	Global Entrepreneurship monitor (GEM) database	For independent variable determination **(TEA_ido)**
High Job Creation Expectation Rate Entrepreneurship activity	Percentage of those involved in TEA who expect to create 6 or more jobs in 5 years.	GEM database	For independent variable determination **(HJCER)**
Innovation Entrepreneurship **(Innovn)**	Percentage of those involved in TEA who indicate that their product or service is new to some or all (at least some) customers.	GEM database	For independent variable determination **(Tea_cs)**
	Percentage of those involved in TEA who indicate that few or no other businesses offer the same product.	GEM database	For independent variable determination **(Tea_cm)**
	Percentage of those involved in TEA who indicate for their business entities that they have used new technology, in the last five years (1-5 years).	GEM database	For independent variable determination **(Tea_nt)**
Productive Entrepreneurship	Derived from the principal component analysis of innovation entrepreneurship, improvement-driven motivated opportunity-based entrepreneurship, and high job creation expectation rate entrepreneurial activity	Computed using **(Innovn), (TEA_ido),** and **(HJCER)** data from GEM database	Independent variable of interest **(Prd_Ent)**
Measures of income Poverty	• Poverty headcount ratio at \$1.90 a day in 2011 PPP (for extreme poverty rates) • Poverty headcount ratio at \$3.20 a day in 2011 PPP (for middle-income poverty rates)	World Bank Poverty and Inequality Platform (or PovcalNet) Database	Dependent variables **(lnhc_19)** **&** **(lnhc_32)** respectively
Inequality	Gini-coefficient/index: The Gini index, a well-accepted measure of inequality, calibrates the percentage of income distribution among individuals in a country relative to the entire population. Higher Gini index figures portray higher levels of inequality and vice versa.	World Bank Poverty and Inequality Platform (or PovcalNet) Database	Independent variable (control variable)

Population	Total number of people living in a country	WDI/ILO database	For independent variable determination
Human capital	The logarithms of human capital (education index) derived from the average of expected years of schooling index and the mean years of schooling index.	UNDESA, & UNDP HDR WDI (2022), Barro and Lee (2018), OECD (2022), UNESCO Institute for Statistics (2022) and UNICEF Multiple Indicator Cluster Surveys (various years).	Independent variable
	Initial life expectancy at birth	WDI database, UNDESA, & UNDP HDR	Independent variable
Institutions (Initial institutional quality)	***Voice and accountability (VA):*** Measure country performance on the ability of institutions to protect civil liberties, extent of citizens participation in the selection of government, independence of the media, equal opportunity for all, transparency of the business environment and government actions (including actions on budgeting), and institutional stability and accountability.	World Bank World Governance Indicator (WGI) database	Independent variables of interest (sVA, sPSV, sGE, sRQ, sRL, & sCC respectively)
	Political stability and absence of violence (PSV): Measure country performance on the likelihood that the government is vulnerable to change through violent or overthrown by unconstitutional means.	WGI database	
	Government effectiveness (GE): Measures country performance on the quality of public service provision, civil service competency and independence from political pressures, and the government's capability for budgeting financial management, as well as the ability to plan and implement sound policies.	WGI database	
	Regulation quality (RQ): Measures country performance on the burden of regulations on business, price controls, the government's role in the economy, foreign investment regulation, and regulations on labour, trade, foreign currency, interest rates, price stability, tax systems, and private sector participation in infrastructure projects.	WGI database	
	Rule of law (RL):		

	Measures country performance on the extent to which the public has confidence in and abides by rules of society, incidence of violent and nonviolent crime, effectiveness and predictability of the judiciary, and the enforceability of contracts, security of property rights, and protection of intellectual property	WGI database	
	Control of corruption (CC): Measures country performance on the frequency of additional payments to get things done, the effects of corruption on the business environment, grand corruption in the political arena, and the tendency of elites to engage in state capture.	WGI database	
Gross domestic capital formation (% of GDP)	Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress." According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.	WDI database	**GDCF** For determination of Gross domestic capital formation per worker as an independent variable
Gross domestic capital formation per labour/work force	Derived from the ratio of gross domestic capital formation (measured in constant 2015 prices) to the labour force in population of economies.	WDI database	Independent variable **(ln Gdcf)**
Total labour force	Labor force comprises people ages 15 and older who supply labour for the production of goods and services during a specified period. It includes people who are currently employed and people who are unemployed but seeking work as well as first-time jobseekers. Not everyone who works is included, however. Unpaid workers, family workers, and students are often omitted, and some countries do not count members of the armed forces. Labor force size tends to vary during the year as seasonal workers enter and leave.	WDI database	For independent variable determination

Share of active labour force in population	Derived from the ratio of total labour force to the population of economies.	WDI database	Independent variable **(lnLfpop)**
Commodity terms of trade	Annualised log change in commodity terms of trade	Gruss, Bertrand, and Suhaib Kebhaj (2019) of the IMF	Instrumental variables for measures of economic growth
Commodity import price index	Annualised log change in commodity import price index		
Commodity export price index	Annualised log change in commodity export price index		
Country Mean Temperature (Climate data)	Annualised change in country mean temperature measured in degrees Celsius	Climate Change Knowledge Portal of the World Bank Group (2021)	
Country Mean Precipitation (Rain fall)	Annualised log change in country mean precipitation		
Settler mortality	Log of potential settler mortality, measured in terms of deaths per annum per 1000 “mean strength” (constant population)	Acemoglu et al. (2001 & 2002)	Instrumental variables for institutional quality
Absolute Latitude	It is a dummy variable: (Absolute value of Latitude)/90 – distance from the equator	La Porta et al. (1999), and Hall and Jones (1999)	
Legal origin	It is a dummy variable. The legal origin of a country can be British, French, German, Socialist or Scandinavian. Each takes the value one if the country has the legal origin and zero if not.	La Porta et al. (1999)	
Ethnic fractionalization	It is the probability that two inhabitants of a country do not speak the same language. Data is obtained from the Historical Index of Ethnic Fractionalisation dataset.	Drazanova, L. (2020)	

Appendix 5B: Principal Components Analyses (PCA) Results for Institutional Quality Across Chapters

Appendix 5B1: Institutional Quality PCA Results for Chapter Two

Principal Components Correlation

Principal components/correlation		**Number of obs**	**1,583**
		No. of components	**6**
		Trace	**6**
Rotation: (unrotated = principal)		**Rho**	**1.000**

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	5.24602	4.86015	0.8743	0.8743
Comp2	0.385862	0.193767	0.0643	0.9386
Comp3	0.192094	0.085297	0.032	0.9707
Comp4	0.106797	0.068244	0.0178	0.9885
Comp5	0.038553	0.007874	0.0064	0.9949
Comp6	0.030679	.	0.0051	1

Principal Components (Eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Unexplained
VA	0.4019	0.0107	0.8714	-0.2308	-0.1248	0.101	0
PSV	0.3582	0.9118	-0.1485	0.1241	0.0083	0.053	0
GE	0.4216	-0.2494	-0.3078	0.1164	-0.6928	0.4144	0
RQ	0.4156	-0.2578	0.0723	0.748	0.4429	0.006	0
RL	0.4285	-0.1219	-0.1636	-0.1635	-0.1587	-0.8502	0
CC	0.4196	-0.1584	-0.3031	-0.5758	0.532	0.3039	0

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy

Variable	KMO
VA	0.9266
PSV	0.9627
GE	0.876
RQ	0.894
RL	0.8803
CC	0.9042
Overall	**0.9028**

Results of Horn's Parallel Analysis for principal components
180 iterations, using the p95 estimate

Component or Factor	Adjusted Eigenvalue	Unadjusted Eigenvalue	Estimated Bias
1	5.146398	5.246015	0.099617
2	0.31107	0.385862	0.074791
3	0.179692	0.192094	0.012403
4	0.130781	0.106797	-0.02398
5	0.107203	0.038553	-0.06865
6	0.124857	0.030679	-0.09418

Criterion: retain adjusted components > 1

Appendix 5B2: Institutional Quality PCA Results for Chapter Three

Principal Components Correlation

Principal components/correlation	**Number of obs**	**429**
	No. of components	**6**
	Trace	**6**
Rotation: (unrotated = principal)	**Rho**	**1.000**

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	4.63542	4.05507	0.7726	0.7726
Comp2	0.580353	0.061416	0.0967	0.8693
Comp3	0.518937	0.398915	0.0865	0.9558
Comp4	0.120022	0.040525	0.02	0.9758
Comp5	0.079497	0.013727	0.0132	0.989
Comp6	0.06577	.	0.0110	1

Principal Components (Eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Unexplained
VA	0.3388	-0.499	0.7881	0.0253	-0.0179	0.1189	0
PSV	0.3308	0.8425	0.3851	0.1796	0.0139	0.0044	0
GE	0.4371	-0.0579	-0.3496	0.2215	-0.3053	0.7356	0
RQ	0.4346	-0.1907	-0.2549	0.6216	0.3784	-0.4246	0
RL	0.4471	-0.0288	-0.1387	-0.3283	-0.6471	-0.5035	0
CC	0.4426	0.0259	-0.1555	-0.651	0.5869	0.1047	0

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy

Variable	KMO
VA	0.9113
PSV	0.9374
GE	0.8569
RQ	0.8834
RL	0.8913
CC	0.913
Overall	**0.8935**

Results of Horn's Parallel Analysis for principal components
180 iterations, using the p95 estimate

Component or Factor	Adjusted Eigenvalue	Unadjusted Eigenvalue	Estimated Bias
1	4.566626	4.635421	0.068795
2	0.533982	0.580353	0.046371
3	0.481419	0.518937	0.037518
4	0.114378	0.120022	0.005644
5	0.140885	0.079497	-0.06139
6	0.16271	0.06577	-0.09694

Criterion: retain adjusted components > 1

Appendix 5B3: Institutional Quality PCA Results for Chapter Four

Principal Components Correlation

Principal components/correlation	**Number of obs**	**856**
	No. of components	**6**
	Trace	**6**
Rotation: (unrotated = principal)	**Rho**	**1.000**

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	5.05742	4.63604	0.8429	0.8429
Comp2	0.421379	0.118704	0.0702	0.9131
Comp3	0.302675	0.177159	0.0504	0.9636
Comp4	0.125515	0.077397	0.0209	0.9845
Comp5	0.048119	0.003227	0.008	0.9925
Comp6	0.044891	.	0.0075	1

Principal Components (Eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Unexplained
VA	0.384	0.1176	0.9035	-0.044	0.1336	-0.0506	0
PSV	0.3616	0.8587	-0.2628	0.2293	0.0811	0.0608	0
GE	0.4247	-0.2945	-0.2546	0.0922	0.5717	-0.5769	0
RQ	0.4154	-0.3835	-0.0463	0.652	-0.146	0.4815	0
RL	0.4346	-0.059	-0.0948	-0.1923	-0.7731	-0.405	0
CC	0.4243	-0.1076	-0.1966	-0.6892	0.1725	0.5148	0

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy

Variable	KMO
VA	0.9337
PSV	0.9359
GE	0.8543
RQ	0.8644
RL	0.8795
CC	0.8984
Overall	**0.8895**

Results of Horn's Parallel Analysis for principal components
180 iterations, using the p95 estimate

Component or Factor	Adjusted Eigenvalue	Unadjusted Eigenvalue	Estimated Bias
1	5.008056	5.057421	0.049365
2	0.390892	0.421379	0.030487
3	0.277182	0.302675	0.025493
4	0.148142	0.125515	-0.02263
5	0.084119	0.048119	-0.036
6	0.09161	0.044891	-0.04672

Criterion: retain adjusted components > 1

Appendix 5C: Usable Observations by Region, Country and Year

Appendix 5C1: Usable Observations by Region, Country and Year for Chapter Two

East Asia and Pacific																							
Australia	2001	2003	2004	2008	2010	2014	2016	2018															
China	1996	2002	2005	2008	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020								
Fiji	2002	2008	2013	2019																			
Indonesia	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Japan	2008	2010	2013																				
Kiribati	2006	2019																					
Korea, Rep.	2006	2008	2010	2012	2014	2016																	
Lao PDR	2002	2007	2012	2018																			
Malaysia	2003	2006	2008	2011	2013	2015	2018																
Micronesia, Fed. Sts.	2005	2013																					
Mongolia	1998	2002	2007	2010	2011	2012	2014	2016	2018														
Myanmar	2015	2017																					
Papua New Guinea	1996	2009																					
Philippines	2000	2003	2006	2009	2012	2015	2018																
Samoa	2002	2008	2013																				
Solomon Islands	2005	2012																					
Thailand	1996	1998	2000	2002	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			
Timor-Leste	2001	2007	2014																				
Tonga	2000	2009	2015																				
Vanuatu	2010	2019																					
Vietnam	2002	2004	2006	2008	2010	2012	2014	2016	2018	2020													
Europe and Central Asia																							
Albania	1996	2002	2005	2008	2012	2014	2015	2016	2017	2018	2019	2020											
Armenia	1996	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Austria	1996	1998	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		

Azerbaijan	2001	2002	2003	2004	2005																		
Belarus	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Belgium	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020				
Bosnia and Herzegovina	2001	2004	2007	2011																			
Bulgaria	2001	2003	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020						
Croatia	1998	2000	2001	2004	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020						
Cyprus	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020						
Czech Republic	1996	2002	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020				
Denmark	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020				
Estonia	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Finland	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020				
France	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	2019	2020																					
Georgia	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	2019	2020																					
Germany	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	2015	2016	2017	2018	2019																		
Greece	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020				
Hungary	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Iceland	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017								
Ireland	1996	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Italy	1998	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			
Kazakhstan	1996	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018				
Kosovo	2003	2005	2006	2009	2010	2011	2012	2013	2014	2015	2016	2017											
Kyrgyz Republic	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Latvia	1996	1998	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Lithuania	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Luxembourg	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

Moldova	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Montenegro	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018									
Netherlands	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020						
North Macedonia	1998	2000	2002	2003	2004	2005	2006	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019				
Norway	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019					
Poland	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Portugal	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020					
Romania	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Russian Federation	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Serbia	2002	2003	2004	2005	2006	2007	2008	2009	2010	2012	2013	2014	2015	2016	2017	2018	2019	2020					
Slovak Republic	1996	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019						
Slovenia	1998	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			
Spain	1996	1998	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Sweden	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			
Switzerland	2000	2002	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018								
Tajikistan	2003	2004	2007	2009	2015																		
Turkey	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019					
Ukraine	1996	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			
United Kingdom	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Latin America and Caribbean																							
Belize	1996	1998																					
Bolivia	2000	2001	2002	2004	2005	2006	2007	2008	2009	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020				
Brazil	1996	1998	2001	2002	2003	2004	2005	2006	2007	2008	2009	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Chile	1996	1998	2000	2003	2006	2009	2011	2013	2015	2017	2020												
Colombia	1996	2000	2001	2002	2003	2004	2005	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			
Costa Rica	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Dominican Republic	1996	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Ecuador	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020				

El Salvador	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Guatemala	1998	2000	2006	2014																			
Haiti	2001	2012																					
Honduras	1996	1998	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Jamaica	1996	2002	2004																				
Mexico	1998	2000	2002	2004	2005	2006	2008	2010	2012	2014	2016	2018	2020										
Nicaragua	1998	2001	2005	2009	2014																		
Panama	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Paraguay	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			
Peru	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Uruguay	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020								
Venezuela, RB	1998	2001	2002	2003	2004	2005	2006																
Middle East and North Africa																							
Egypt, Arab Rep.	2004	2008	2010	2012	2015	2017	2019																
Iran, Islamic Rep.	1998	2005	2006	2009	2013	2014	2015	2016	2017	2018	2019												
Iraq	2006	2012																					
Israel	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018					
Jordan	2002	2006	2008	2010																			
Malta	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020								
Morocco	1998	2000	2006	2013																			
Syrian Arab Republic	1996	2003																					
Tunisia	2000	2005	2010	2015																			
United Arab Emirates	2013	2018																					
West Bank and Gaza	2004	2005	2006	2007	2009	2010	2011	2016															
Yemen, Rep.	1998	2005	2014																				
North America																							
Canada	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
United States	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

South Asia										
Bangladesh	2000	2005	2010	2016						
Bhutan	2003	2007	2012	2017						
India	2004	2009	2011	2015	2016	2017	2018	2019	2020	
Maldives	2002	2009	2016	2019						
Nepal	2003	2010								
Pakistan	1998	2001	2004	2005	2007	2010	2011	2013	2015	2018
Sri Lanka	2002	2006	2009	2012	2016	2019				
Sub-Saharan Africa										
Angola	2000	2008	2018							
Benin	2003	2011	2015	2018						
Botswana	2002	2009	2015							
Burkina Faso	1998	2003	2009	2014	2018					
Burundi	1998	2006	2013							
Cabo Verde	2001	2007	2015							
Cameroon	1996	2001	2007	2014						
Chad	2003	2011	2018							
Comoros	2004	2014								
Congo, Dem. Rep.	2004	2005	2011	2012						
Cote d'Ivoire	1998	2002	2008	2015	2018					
Djibouti	2002	2012	2013	2017						
Eswatini	2000	2009	2016							
Ethiopia	2004	2010	2015							
Gabon	2005	2017								
Gambia, The	1998	2003	2010	2015	2020					
Ghana	1998	2005	2012	2016						
Guinea	2002	2007	2012	2018						
Guinea-Bissau	2002	2010	2018							

Kenya	2005	2015	2020					
Lesotho	2002	2017						
Liberia	2007	2014	2016					
Madagascar	2001	2005	2010	2012				
Malawi	2004	2010	2016	2019				
Mali	2001	2006	2009	2018				
Mauritania	2000	2004	2008	2014				
Mauritius	2006	2012	2017					
Mozambique	1996	2002	2008	2014	2019			
Namibia	2003	2009	2015					
Niger	2005	2007	2011	2014	2018			
Nigeria	1996	2003	2010	2012	2015	2018		
Rwanda	2000	2005	2010	2013	2016			
Sao Tome and Principe	2000	2010	2017					
Senegal	2001	2005	2011	2018				
Seychelles	2006	2013	2018					
Sierra Leone	2003	2011	2018					
South Africa	2000	2005	2008	2010	2014	2009	2016	
Sudan	2009	2014						
Tanzania	2000	2007	2011	2018				
Togo	2006	2011	2015	2018				
Uganda	1996	1999	2002	2005	2009	2012	2016	2019
Zambia	1996	1998	2002	2004	2006	2010	2015	
Zimbabwe	2011	2017	2019					

Appendix 5C2: Usable Observations by Region, Country and Year for Chapter Three

East Asia and Pacific	
China	1990 1993 1996 1999 2002 2005 2008 2010 2011 2012 2013 2014 2015 2016
Indonesia	1990 1993 1996 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Japan	2008 2010 2013
Korea, Rep.	2006 2008 2010 2012 2014 2016
Lao PDR	1992 1997 2002 2007 2012 2018
Malaysia	1992 1995 1997 2003 2006 2008 2011 2013 2015
Myanmar	2015 2017
Philippines	1991 1994 1997 2000 2003 2006 2009 2012 2015 2018
Thailand	1990 1992 1994 1996 1998 1999 2000 2002 2004 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Vietnam	1992 1997 2002 2004 2006 2008 2010 2012 2014 2016 2018
Europe and Central Asia	
Turkey	1994 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Latin America and Caribbean	
Bolivia	1992 1997 1999 2000 2001 2002 2004 2005 2006 2007 2008 2009 2011 2012 2013 2014 2015 2016 2017 2018
Brazil	1990 1992 1993 1995 1996 1997 1998 1999 2001 2002 2003 2004 2005 2006 2007 2008 2009 2011 2012 2013 2014 2015 2016 2017 2018
Chile	1990 1992 1994 1996 1998 2000 2003 2006 2009 2011 2013 2015 2017
Colombia	1992 1996 1999 2000 2001 2002 2003 2004 2005 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Costa Rica	1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Ecuador	1994 1999 2000 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Mexico	1992 1994 1996 1998 2000 2002 2004 2005 2006 2008 2010 2012 2014 2016 2018
Peru	1994 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Middle East and North Africa	
Egypt, Arab Rep.	1990 1995 1999 2004 2008 2010 2012 2015 2017
Israel	1992 1997 2001 2005 2007 2010 2012 2014 2016
Morocco	1990 1998 2000 2006 2013

Tunisia	1990	1995	2000	2005	2010	2015						
South Asia												
Bangladesh	1991	1995	2000	2005	2010	2016						
India	1993	2004	2009	2011								
Nepal	1995	2003	2010									
Pakistan	1990	1996	1998	2001	2004	2005	2007	2010	2011	2013	2015	2018
Sri Lanka	1990	1995	2002	2006	2009	2012	2016					
Sub-Saharan Africa												
Botswana	1993	2002	2009	2015								
Burkina Faso	1994	1998	2003	2009	2014							
Cameroon	1996	2001	2007	2014								
Ethiopia	1995	1999	2004	2010	2015							
Ghana	1991	1998	2005	2012	2016							
Kenya	1992	1994	1997	2005	2015							
Lesotho	1994	2002	2017									
Malawi	1997	2004	2010	2016								
Mauritius	2006	2012	2017									
Mozambique	1996	2002	2008	2014								
Namibia	1993	2003	2009	2015								
Nigeria	1992	1996	2003	2009	2018							
Rwanda	2000	2005	2010	2013	2016							
Senegal	1991	1994	2001	2005	2011							
South Africa	1993	1996	2000	2005	2008	2010	2014					
Tanzania	1991	2000	2007	2011	2017							
Uganda	1992	1996	1999	2002	2005	2009	2012	2016				
Zambia	1991	1993	1996	1998	2002	2004	2006	2010	2015			

Appendix 5C3: Usable Observations by Region, Country and Year for Chapter Four

East Asia and Pacific																			
Australia	2003	2004	2008	2010	2014	2016	2018												
China	2002	2005	2008	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020					
Indonesia	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018		
Japan	2008	2010	2013																
Korea, Rep.	2008	2010	2012	2014	2016														
Malaysia	2006	2008	2011	2013	2015														
Philippines	2006	2009	2012	2015															
Thailand	2002	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019			
Tonga	2009																		
Vanuatu	2010	2014																	
Europe and Central Asia																			
Austria	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018				
Belarus	2019																		
Belgium	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016					
Bosnia and Herzegovina	2011																		
Bulgaria	2014	2015	2016	2017	2018														
Croatia	2004	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020					
Cyprus	2005	2012	2013	2016	2017	2018	2019												
Czech Republic	2006	2007	2008	2011	2012	2013													
Denmark	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014							
Estonia	2008	2012	2013	2014	2015	2016	2017												
Finland	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016					
France	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Georgia	2014	2015	2016																
Germany	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Greece	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	

Hungary	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016				
Iceland	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017				
Ireland	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Italy	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Kazakhstan	2007	2010	2011	2012	2014	2015	2016	2017											
Kosovo	2014																		
Latvia	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019				
Lithuania	2007	2009	2011	2012	2013	2014													
Luxembourg	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Montenegro	2010																		
Netherlands	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019			
North Macedonia	2002	2003	2004	2005	2006	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Norway	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Poland	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Portugal	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Romania	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016									
Russian Federation	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Serbia	2007	2008	2009																
Slovak Republic	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019									
Slovenia	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Spain	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Sweden	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Switzerland	2002	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018					
Turkey	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019					
United Kingdom	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Latin America and Caribbean																			
Bolivia	2008	2009	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020							
Brazil	2002	2003	2004	2005	2006	2007	2008	2009	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	

Chile	2003	2006	2009	2011	2013	2015	2017											
Colombia	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020					
Costa Rica	2010	2011	2012	2014	1996	2003	2007	2008	2009	2010	2012							
Ecuador	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
El Salvador	2002	2005	2006	2007	2008	2012	2013	2014	2015	2016								
Guatemala	2014																	
Mexico	2002	2004	2005	2006	2008	2010	2012	2014	2020									
Panama	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019							
Peru	2002	2003	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2020	
Uruguay	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			
Venezuela, RB	2002	2003	2004	2005														
Middle East																		
Iran, Islamic Rep.	2009	2013	2014	2015	2016	2017	2018	2019										
Israel	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
United Arab Emirates	2018	2009	2010	2011														
South Asia																		
India	2015	2016	2017	2018	2019	2020												
Pakistan	2010	2011																
African Countries																		
Algeria	2011																	
Angola	2008	2018																
Botswana	2015																	
Burkina Faso	2014																	
Cameroon	2014																	
Egypt, Arab Rep.	2008	2010	2012	2015	2017	2019												
Ghana	2012																	
Nigeria	2012																	
South Africa	2008	2010	2014															

Tunisia	2010	2015		
Uganda	2009	2012	2016	2019
Zambia	2010			