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EMPLOYMENT AND HOUSEHOLD WELFARE IN GHANA

RICHARD OSEI BOFAH

DEPARTMENT OF ECONOMICS

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BY

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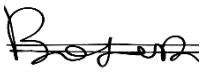
DECLARATION

I, Richard Osei Bofah, do hereby declare that this thesis is the result of my own research work and that neither the whole nor part of this work has been presented in this University or any other institution for an award of any academic degree. All references used in the work have been duly acknowledged.

Signature:  27/07/2020

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We, the undersigned supervisors, certify that this thesis was supervised in accordance with procedures laid down by the University of Ghana for an award of a Doctor of Philosophy degree.

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ABSTRACT

The developing world is challenged with a large number of persons involved in less productive and vulnerable employment. Ghana is not an exemption. This limits the country's effort towards a successful achievement of the Sustainable Development Goals by 2030, particularly Goals 1, 8 and 10 which relate to 'no poverty', 'decent work and economic growth' and 'lower inequality', respectively. This study broadly examines the role of employment in explaining welfare in Ghana. To analyse this broad objective, the study carries out separate analyses to examine three specific research objectives and corresponding questions.

The study contributes to the literature by analysing the effects of different groups of employment status on rural-urban household consumption welfare. Using data from the seventh round of the Ghana Living Standards Survey conducted in 2016/17 (GLSS7), the study finds higher returns to non-farm self-employed with employees (employers) than other forms of employment status. Non-farm self-employed without employees (own-account) and formal employees contribute to improving household welfare at the lower and more upper quantiles, respectively. Returns to non-farm own-account are found to be generally higher than agricultural own-account. The study finds detrimental effects of informal paid employment, unpaid employment, inactivity and unemployment on welfare. It shows clear consumption inequality gaps between rural and urban households, with the latter reporting a higher welfare at the mean and along all quantiles than the former. The observed inequality gaps are wider among the poorer than richer households. These gaps are primarily due to the differences in returns to observable characteristics between rural and urban households. Among others, employment, education and household size contribute most to explaining the observed rural-urban inequality gaps in Ghana.

Also, the study contributes to the literature by examining the degree and determinants of employment diversification within and across the agricultural, services and industry sectors among rural households. Relying on data from the fifth and seventh rounds of the Ghana Living Standards Surveys conducted in 2005/06 and 2016/17 respectively (GLSS5 and GLSS7), the study reveals a greater degree of employment diversification within the agricultural sector followed by the services and industry sectors, respectively. Further, it is established that factors such as gender, marital status, education, landholdings, location, seasonal migration and infrastructural development remain key determinants of the on-going employment diversification in rural Ghana. For instance, being a female-head relative to being a male-head lowers employment diversification within the agricultural sector but increases diversification within the non-farm sectors (services and industry). In the same vein, infrastructural development in rural communities largely favours a higher degree of employment diversification within the non-farm sectors as compared to the agricultural sector. Another key finding is that education significantly decreases households' diversification within the agricultural sector but increases that of the non-farm sectors.

Further, the study contributes to the existing literature by examining the effect of employment diversification on the level of rural inequality and its change over time. Using the GLSS5 and GLSS7 datasets, the study establishes that the sum effect of employment diversification within the three major sectors contributes to decreasing the level of rural inequality in 2005/06 and 2016/17 and its change over the two periods while diversification across the sectors rather worsens rural inequality. The net effect of employment diversification is shown to be inequality-increasing. Regarding the independent effects of diversification within each of the three sectors, the agricultural and services sectors consistently contribute to reducing the level of and changes

in rural inequality. Diversification within the industry sector worsens the change in inequality but marginally influences the level of inequality. A stimulating finding is that diversification within the agricultural sector contributes considerably to reducing the level of rural inequality than services and any other factor. In most cases, the effects of diversification are even much stronger when secondary employment activities are accounted for.

The following recommendations are based on the study's findings. To sustain and further enhance the welfare gains of non-farm employers, the government through its relevant institutions such as the Registrar General's Department, the National Board for Small Scale Industries (NBSSI), the Ministry of Trade and Industry, the Ministry of Employment and Labour Relations and the Ministry of Business Development should expedite a nation-wide formalisation of the informal sector with emphasis on business registration, records keeping, customer service, innovation and basic management, among others. These actions are expected to improve and expand businesses owned by non-farm employers with the potential of generating employment and earnings opportunities for the unemployed, the unpaid worker, and the inactive, as well as other vulnerable workers including the agricultural own-account.

Again, it is recommended that for rural households to experience a greater degree of employment diversification in the non-farm sectors, the government through its relevant institutions including the Electricity Company of Ghana, the Ghana Water Company, the Ministry of Roads, Highways and Transport, the Ministry of Trade and Industry, the Bank of Ghana and the National Development Planning Commission should prioritise infrastructural development across the rural communities. A particular attention should be geared towards the expansion or development of marketplaces, electricity, roads, portable water systems and financial institutions (such as banks and micro-finance) in the rural areas. Another policy direction is that government should aim at

capitalising on the inequality-reducing effect of employment diversification within the services sector in rural Ghana. Key government institutions including the Ministry of Business Development**,** the Ministry of Trade and Industry, and the NBSSI should encourage, train and support rural farmers to complement their farming activities with wholesale and retail trading, and other forms of services.

Furthermore, the observed negative linkage between employment diversification in the agricultural sector and education should be properly addressed through a specific policy intervention and public re-orientation. By encouraging educated persons into the agricultural sector, the country can minimise the socio-economic cost of the large numbers of unemployed secondary school leavers and tertiary graduates. In order to attract a good number of these leavers and graduates into the agricultural sector, the government, through its key stakeholders including the Ministry of Food and Agriculture, the Ministry of Business Development**,** the Ministry of Trade and Industry, the NBSSI, the ADB and the Ghana EXIM Bank, should aim at providing different forms of assistance such training, storage and credit facilities, and ready market in the sector. Such initiatives can improve the productivity of and returns to the agricultural sector and consequently minimise the present rural-urban consumption inequality gaps. By promoting a higher diversification in agricultural employment, the country stands a better chance of fighting against the rising rural inequality. Relatedly, government's current initiatives on planting for food and jobs, rearing for food and jobs, one-village-one-dam and one-district-one-factory should, through the Ministry of Special Development Initiative, be used to stimulate employment opportunities across the rural areas with a particular attention on the savannah belt of the country. These policy initiatives should also aim at motivating and benefiting the unpaid workers, the unemployed and the inactive.

DEDICATION

I dedicate this thesis in memory of my late mother, Mrs. Victoria Anane, for instilling in me personal discipline and hard work. Again, this research work is dedicated to my older brother, Mr. Charles Bofah-Konadu, and uncle, Dr. Paul Owusu-Baah, for their advice and financial assistance throughout my PhD programme. Finally, this thesis is dedicated to my nuclear family especially to my beloved and cherished wife, Mrs. Dorcas Osei Bofah, for her prayers, support and encouragement.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

CQR	Conditional Quantile Regression
EAS	Enumeration Areas
ERP	Economic Recovery Programme
GDP	Gross Domestic Product
GLSS	Ghana Living Standards Survey
GOLOGIT	Generalised ordered logit
GSS	Ghana Statistical Service
IF	Influence Function
ILO	International Labour Organisation
IMF	International Monetary Fund
ISIC	International Standard Industrial Classification
LFS	Labour Force Survey
MDGs	Millennium Development Goals
MSMEs	Micro, Small and Medium Enterprises
OBD	Oaxaca-Blinder Decomposition
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
PSUS	Primary Sampling Units
RIF	Re-centred Influence Function
SDGs	Sustainable Development Goals
UQD	Unconditional Quantile Decomposition
UQR	Unconditional Quantile Regression

CHAPTER ONE

INTRODUCTION

1.0 Background to the study

Many countries, particularly in the developing world, have been advised to place job creation at the core of their development plans. Some have argued that nations can promote decent employment through the expansion and development of productive enterprises (Schumpeter, 1934; Baumol, 1990; McMillan & Woodruff, 2002; van Praag & Versloot, 2007; Ackah et al., 2017). The challenge, however, is that in many developing nations, these enterprises continue to remain very micro and small with few becoming medium and large. As a result, many researchers have debated over the importance of these enterprises towards employment or job creation, welfare improvement and, in general, economic development (Dennis, 1996; Spanos et al., 2001; McMillan & Woodruff, 2002; Abor & Biekpe, 2005; Lazear, 2005; Goetz et al., 2012). Until the seminal paper of Birch (1987), the significance of small businesses towards employment generation was nearly ignored and underestimated by policy makers in the United States of America (see Henderson & Weiler, 2010; Goetz et al., 2012).

While there is enough evidence to show that micro, small and medium enterprises (MSMEs) generate more employment in the developing and emerging economies (Abor & Quartey, 2010; Goetz et al. 2012; Ackah et al., 2017), a larger number of workers in these nations are, however, considered to be in vulnerable employment (International Labour Organisation [ILO], 2014a,

2018). For example, in 2017, the share of workers in vulnerable employment worldwide was estimated to be around 42.5%, representing about 1.4 billion people (ILO, 2018). Vulnerable employment is reported to be highest for developing nations (76.5%) followed by emerging and developed nations (46.2% and 10%, respectively) in the same period of 2017 (ILO, 2018). The dominance of vulnerable employment has limited governments' efforts towards addressing the challenges of working poverty over the years (ILO, 2018). In the developing world, for instance, extreme working poverty-consisting of workers whose per capita household consumption falls below US$1.9 per day in purchasing power parity (PPP)-was estimated to reach around 40% of all employed persons by the end of 2018 (ILO, 2018).

Added to the above, unemployment threatens many economies. In 2017, around 192.7 million (5.6%) people across the globe were considered to be unemployed and this was reported to be highest among emerging nations (143.0 million) followed respectively by developed (34.1 million) and developing (15.6 million) nations (ILO, 2018). By 2019, the number of unemployed persons is projected to rise for emerging and developing nations and the world at large while that of the developed nations is expected to fall by some margin (ILO, 2018). These trends in unemployment and vulnerable employment have the potential of slowing down the efforts of many governments towards a successful achievement of most (if not all) of the Sustainable Development Goals (SDGs) by 2030.

The Ghanaian context is similar to the global picture. Employment status – thus, a person's position or status in his or her work - remains a critical challenge in Ghana's labour market. Currently, majority of Ghanaian workers are engaged in vulnerable employment, consisting of

those whose employment statuses are self-employed without employees (own-account) and unpaid family workers. Available data shows that own-account alone represent about 46.4% of the employed (GSS, 2014). Approximately half of the employed women and rural workers (50.5% and 52%, respectively) are engaged as own-account workers compared to their men and urban counterparts, reporting 41.9% and 40.4%, respectively (GSS, 2014). Further, rural dwellers who are unpaid family workers (32.5%) is thrice those engaged in paid employment (10.5%) while just around 13.2% of the employed women are in paid employment as compared to 27.9% of them being engaged as unpaid family workers (GSS, 2014). While unemployment continues to be a national challenge, evidence shows a much worrying situation among women and youth compared to men and adult population (GSS, 2014).

1.1 Statement of the problem

The Ghanaian labour market has experienced and continues to experience more structural changes over the decades (Aryeetey & Harrigan, 2000; Baah-Boateng, 2012, 3013; Honorati & de Silva, 2016). From the time of Ghana's independence up to the mid-1980s, various governments supported policies on industrialisation through the creation of state-owned enterprises. This was not unique to Ghana as we saw many African economies pursuing a similar goal around the same period (Aryeetey & Harrigan, 2000). This created the opportunities for many people to gain employment in the formal sector. However, these opportunities were unevenly spread as most of these enterprises were established in the urban areas and major cities of the country (Aryeetey & Harrigan, 2000). Between the 1970s and early 1980s, the Ghanaian economy began to experience a number of problems including low and negative growth rates, high inflation, huge deficits and instability of the exchange rate (Aryeetey & Harrigan, 2000). Within the same period, the country reported a much fluctuation in the share of formal

employment and this was coupled with a substantial reduction in real labour earnings (Fine & Boateng, 2000).

Due to the severity of the crisis at the time, the government in 1983 was advised by the World Bank and the International Monetary Fund (IMF) to undertake certain economic reforms under the so-called Economic Recovery Programme (ERP). The ERP mainly focused on stabilisation and liberalisation policies. As part of the reforms, the government was tasked to embark on privatisation and re-deployment exercises which consequently led to the retrenchment of many public employees (Fine & Boateng, 2000). Coupled with the inability of the private formal sector to absorb the then growing labour force, many workers and new job seekers were pushed into the informal sector as self-employed or informal wage earners. Today, the informal sector which cuts across all unregistered businesses and employees, businesses with few workers and all employees that are outside formal arrangement (ILO, 2014a, 2018) remains a greater source of employment, accounting for around 88% of Ghana's working-age population (Ghana Statistical Service [GSS], 2014).

Until 2006, Ghana's economic growth was primarily driven by agriculture (GSS, 2014, 2018). Due to challenges such as low productivity, poor market and unfavourable weather, the agricultural sector now contributes least to economic growth with services being the leading contributor followed by industry. While the agricultural sector continues to remain a major source of rural employment, many households, in attempt to escape unstable income and poverty, have diversified into some non-farm activities like trading and manufacturing (GSS, 2008, 2014, 2016). Evidence shows that the richer rural households tend to participate more in

these non-farm activities than their poorer counterparts (Senadza, 2011; Ackah, 2013; GSS, 2014).

As already indicated above, the employment status of Ghanaian workers remains a critical challenge, with higher fractions of own-account and unpaid workers. In spite of the dominance of informality and vulnerable employment, the country is said to be a success story in Africa, having attained a lower middle income status. Its growth is admired to be among the fastest in Africa and worldwide (GSS, 2014, 2018). For instance, between 2005 and 2017, the Ghanaian economy reported an annual average growth rate of 6.8% (GSS, 2018). Further, the country is praised for meeting the first Millennium Development Goal (MDG) target of halving poverty ahead of time, reporting a reduction in poverty from 51.7% in 1991/1992 to 24.2% in 2012/2013 (GSS, 2014). Added to this, a recent report by the GSS indicates a further fall (though marginal) in Ghana's poverty rate to around 23.4% in 2016/17 (GSS, 2018).

Despite the above success stories, the country continues to face a number of welfare challenges including higher levels of inequality across the country, particularly in rural Ghana (GSS, 2008, 2014, 2018). For instance, between 2005 and 2017 the Gini coefficient for Ghana increased from 41.9% in 2005/06 to 42.3% and 43% in 2012/13 and 2016/17, respectively (GSS, 2018). On the other hand, the rural economy also reported a consistent increase in Gini coefficient from 37.8% in 2005/06 to 40% and 41.8% in 2012/13 and 2016/17 respectively while the Gini coefficient for the urban economy first increased from 38.2% in 2005/06 to 38.8% in 2012/13 before falling to around 37.9% in 2016/17 (GSS, 2018). The northern part of the country, particularly the Upper West and Northern regions, is still characterised by higher levels of inequality (GSS, 2018).

The long history of high inequality in the country seems to support the argument that Ghana's growth has not been strongly pro-poor and inclusive (GSS, 2014, 2018). Despite the overall gains in poverty reduction, evidence points to a higher incidence of poverty rate in rural areas and some regions in the country (GSS, 2008, 2014, 2018). Many Ghanaians, particularly those from lower income households, seem trapped in vulnerable employment (GSS, 2014, 2016; Honorati & de Silva, 2016). Today, the country is troubled with labour underutilisation as it experiences increasing numbers of graduate unemployment and a higher fraction of workers being underemployed (GSS, 2014, 2016). The implication is that Ghana's growth performance has not been accompanied by the creation of sufficient and decent jobs to absorb the growing labour force across the country (Baah-Boateng, 2013; Baah-Boateng & Baffour-Awuah, 2015). Therefore, for Ghana to successfully realise the recent SDGs on poverty, employment and inequality by 2030, a clear understanding of the structural changes in Ghana's labour market and their implications on welfare cannot be underestimated. Thus, any action towards the achievement of no poverty (SDG1), decent work and economic growth (SDG8) and lower inequality (SDG10), among others, can only be fruitful if policy makers are clearly aware of the determining factors and welfare implications of workers' engagement in different employment activities.

1.2 Research objectives

The overall objective of this study is to examine the role of employment in explaining welfare differences among individuals and their households in Ghana. To carefully analyse this main objective, this study sets out three specific objectives as follows:

i. Examine the role of employment status in explaining rural and urban household consumption welfare.
ii. Analyse the degree and determinants of employment diversification among households in rural Ghana.
iii. Examine how employment diversification explains consumption inequality among households in rural Ghana.

1.3 Research questions

To fully analyse the above three specific research objectives, the study seeks to provide plausible answers to the following research questions. The research questions (i), (ii) and (iii) are drawn from specific objectives (i), (ii) and (iii) above, respectively.

i. To what extent do different groups of employment status explain the consumption distributions of rural and urban households?
ii. What are the degree and determinants of employment diversification within and across the three major sectors (agriculture, services and industry) in rural Ghana?
iii. How does employment diversification within and across the three major sectors influence the level of rural inequality and its change over the years?

1.4 Justification of the study

This study is justified on many grounds. First, it extends the literature on the analysis of rural-urban welfare disparities by accounting for the role of different groups of employment status. A literature review conducted shows the study by Tamvada (2010) to be the only published paper which attempted to examine the differential effects of different groups of employment status on overall household consumption welfare in India. Though Tamvada (2010) focused only on the non-farm sector, the findings are, however, stimulating. For instance, the author established significantly higher returns to self-employed with employees (or employers) than other employment status groups. Returns to wage employees were found to be just marginally above that of own-account. Hence, drawing from these findings, the current study extends the literature by incorporating both farm and non-farm sectors, as well as rural and urban dimensions. These extensions are very crucial for policy relevance, particularly in an African context like Ghana. This statement is informed by the recent structural changes of increasing numbers of farm activities in some urban areas and non-farm activities in rural areas of Ghana (GSS, 2008, 2014). Also, a clear distinction is made between formal and informal employees. Employees in public and private formal employment largely enjoy most of the conditions or pillars for decent work relative to those engaged on an informal basis (GSS, 2008, 2014, 2016; Honorati & de Silva, 2016; ILO, 2014a, 2014b, 2018). Further, in recent times, researchers have shown increasing interest in analysing rural-urban inequality gaps (Nguyen et al. 2007; Thu Le & Booth, 2014; Agyire-Tettey et al., 2018). In the developing world, for example, rural-urban welfare disparities have been shown to be important in explaining inequality in general (Nguyen et al., 2007; Go et al., 2007; GSS, 2014).

Second, the study further contributes to the analysis of rural-urban welfare gaps by relying on recently developed unconditional quantile regression (UQR) by Firpo et al. (2009) and unconditional quantile decomposition (UQD) by Fortin et al. (2011). Relative to the standard Ordinary Least Squares (OLS), quantile regressions generally produce consistent and robust estimates even in the presence of outliers (Koenker & Bassett, 1978; Machado & Mata, 2005; Firpo et al., 2009; Borah & Basu 2013). Also, while quantile regressions provide estimates along different quantiles-lower, middle and upper parts-of a distribution, the OLS produces estimates at the mean only. Though previous studies have mostly relied on conditional quantile regression (CQR) by Koenker and Bassett (1978), the UQR is argued to be relatively improved with intuitive interpretation and better generalisation of findings (Firpo et al., 2009; Powell, 2011; Borah & Basu, 2013; Thu Le & Booth, 2014). In the same vein, while the traditional Oaxaca (1973) and Blinder (1973) decomposition approach estimates inequalities gaps between any two groups at the mean only, the UQD rather estimates the gaps along different quantiles of a distribution. Further, results from UQD are argued to be more robust as compared to Oaxaca-Blinder (1973) mean decomposition which often leads to unreliable estimates, for instance, when some of the explanatory variables are categorical in nature (Oaxaca & Ransom, 1999; Barsky et al., 2002; Fortin et al., 2010, 2011).

Third, the study contributes to the debate on rural diversification by relying on an improved measure of diversification. Previous findings on the relationship between inequality and non-farm diversification are mixed (Canagarajah et al, 2001; Kung & Lee, 2001; de Janvry & Sadoulet, 2001; Zhu & Luo, 2006; Senadza, 2011; Scharf & Rahut, 2014). For instance, while the study on rural Ghana by Senadza (2011) established the inequality effects of non-farm

income from wage employment and self-employment to be respectively positive and negative, Zhu and Luo (2006) on rural China, Adam (2001) on rural Egypt and Canagarajah et al. (2001) on rural Ghana and Uganda rather found the effects of non-farm income from wage employment and self-employment to be respectively negative and positive. On the other hand, Scharf & Rahut (2014) found skilled non-farm economic activities to be inequality-increasing relative to unskilled non-farm activities. Apart from these contradictions, the empirical findings on the determinants of rural diversification are also found to be mixed. Among others, these inconsistencies in the literature have been attributed largely to differences in the definitions or measures of diversification used by different authors (Canagarajah et al., 2001; Senadza, 2011, 2012; Scharf & Rahut, 2014). A large number of these previous studies have mostly measured diversification in terms of actual income from economic activities or as dummy or categorical variables for employment participation. These measures are too simplistic and cannot explicitly reveal the extent or degree of rural diversification. Therefore, to overcome these limitations, the study seeks to apply the Shannon entropy index of diversification. Relative to other diversification measures like ogive, locational quotient and Herfindahl, the entropy index offers a unique property of decomposition (Jacquemin & Berry, 1979; Attaran & Zwick, 1987, 1989; Park & Jang, 2012). Simply put, the entropy index offers the flexibility and possibility of decomposing total diversification into within and across groups. Relying on this improved diversification index, the study can appropriately measure the extent or degree of employment diversification within and across the three major sectors (agriculture, services and industry) of an economy. Following these, the study can then examine the potential determinants and inequality effects of employment diversification for rural Ghana.

Finally, the study again contributes to the literature on rural inequality by employing a regression-based decomposition technique by Fields (2003) to estimate the contribution of diversification to the level of and change in Ghana's rural inequality. Different authors have applied different techniques in analysing inequality (see for instance, Ashraf & Ashraf, 1993; Siphambe & Bakwena-Thokweng, 2001; Morduch & Sicular, 2002; Weichselbaumer & Winter-Ebmer, 2005; Yun, 2004, 2006; Manna & Regoli, 2012; Brewer & Wren-Lewis, 2016). Generally, inequality analysis has been predominantly descriptive in nature with over reliance on inequality measures such as the Gini coefficient and Generalised entropy indices (Fields, 2002, 2003; Gunatilaka & Chotikapanich, 2009; Senadza, 2010, 2011). For instance, previous studies on rural Ghana by Senadza (2011) and Canagarajah et al. (2001) relied on descriptive approach and found mixed results on the relationship between inequality and non-farm income from wage employment and self-employment. Though these authors employed datasets for different years, their application of descriptive approach can provide some explanations to such inconsistent findings. In general, the descriptive analysis does not allow researchers to account for a combination of factors that might influence inequality (Fields, 2003; Cowell & Fiorio, 2006; Gunatilaka & Chotikapanich, 2009). Again, they cannot, for instance, quantify the relative contribution of a variable to inequality (Adams, 2001; Fields, 2002, 2003; Gunatilaka & Chotikapanich, 2009). Therefore, to address these limitations, the present study employs a regression-based decomposition technique by Fields (2003). This technique is argued to offer a better flexibility and robustness of estimates (Fields, 2003; Gunatilaka & Chotikapanich, 2009). For instance, it allows researchers to account for a combination of factors or variables with ease as compared to other regression-based techniques which place some restrictions on the number of independent variables to be included for estimation (Fields, 2003; Gunatilaka &

Chotikapanich, 2009). Also, the approach by Fields (2003) is considered to be more robust to different measures of inequality (for example, variance, Gini coefficient and Generalised entropy indices) as compared to others which are mostly limited to just variance analysis (Fields, 2003; Brewer & Wren-Lewis, 2016). Further, unlike previous studies on rural Ghana (see Canagarajah et al., 2001; Senadza, 2011) that focused just on the level of inequality at some given time periods, the Fields' approach allows us to further examine the role of diversification in explaining the change in inequality between different time periods.

1.5 Outline of the study

This study is organised into seven chapters. Chapters one (1) and two (2) respectively provide the introduction to the study and overview of the Ghanaian labour market. The introductory chapter covers the background of the study, statement of the problem, research objectives and questions, as well as the justification of the study. On the other hand, the overview chapter provides brief information on certain concepts and definitions of the labour market and some key structural changes in the Ghanaian economy, with a particular emphasis on the labour market. Chapter three (3) is devoted to the literature review. It reviews relevant and related literature needed for carrying out the study's empirical analyses in chapters four (4), five (5) and six (6) which respectively relate to the first, second and third specific objectives of the study and their corresponding research questions. Chapter seven (7) concludes the entire study with a summary of key findings from chapters 4, 5 and 6 and their associated policy implications, as well as the limitations of the study and suggestions for further research.

CHAPTER TWO

OVERVIEW OF THE GHANAIAN LABOUR MARKET

2.0 Introduction

This chapter provides a brief overview of the Ghanaian labour market. It is divided into three main sub-sections. The first sub-section presents some key concepts and definitions within the labour market context. This is very important as it provides a better understanding and insight into some labour concepts that are discussed in the second sub-section of this chapter, as well as subsequent chapters of the study. The second sub-section of the chapter aims at providing an overview of some structural changes in the Ghanaian labour market with a particular focus on trends in sectoral contributions to employment, types of economic activities, workers' employment and poverty status, labour underutilisation (unemployment and underemployment), job creation by formal and informal enterprises and constraints to enterprise operations towards job creation. The last sub-section shall conclude the chapter.

2.1 Definitions of some key concepts in the labour market

2.1.1 Formal and informal employees

Relying on the definition from the Ghana Statistical Service (GSS), formal employees are defined to include all workers who are entitled to at least one of the following social security incentives: 1) Paid or holiday leave; 2) sick or maternity leave; and 3) verbal or written contract

during the time of job offer. On the other hand, an informal employee is a worker who is not entitled to any of the above three conditions.

2.1.2 Employment status and vulnerable employment

Following ILO and GSS, the study defines employment status to mean individual's position or status in the work he or she does. Specifically, it captures paid employees, self-employed, unpaid workers, apprentices and trainees, as well as casual workers, among others. A paid employee could be a formal or informal worker that receives a wage or salary. Two groups of self-employed are defined, namely, employers and own-account. Employers consist of all self-employed with at least one employee while own-account includes those self-employed who are without any employee(s). Unpaid workers, also known as contributing family workers, are those individuals who work on a family enterprise (farm or non-farm) but are not paid for their effort and time. Apprentices and trainees are those who often go under training (mostly informal) to learn a specific trade or vocation under an experienced master.

Borrowing from ILO and GSS, vulnerable employment is defined as a sum of own-account and contributing family or unpaid workers. Among others, own-account workers are challenged with limited growth and lack of business continuity. Also, people who are engaged as unpaid workers mostly fall under the category of involuntary employment as they largely lack employment opportunities and employable skills.

2.1.3 Decent work

This concept primarily measures the quality of work engaged in by individuals. According to the ILO, a decent work is characterised by employment and earning opportunities, respect for labour right, social security incentives (paid or maternity leave, subsidised medical care, among others) and freedom of expression through negotiation and dialogue. Consequently, vulnerable employment generally falls outside the above conditions for decent work. Comparatively, public and some private formal workers enjoy some level of decent work as compared to informal paid workers that lack these conditions of work.

2.1.4 Time-related underemployment

This study follows the definition used in the Ghana Labour Force (LFS) survey by GSS. It defines time-related underemployment as a labour underutilisation condition where a worker works for less than 35 hours in all jobs per week but still seeking and available to work more hours. Based on this, the underemployed can be considered to be engaged in involuntary employment.

2.1.5 Unemployment

Many countries including Ghana have adopted a similar definition of unemployment by ILO. In particular, the GSS defines the unemployed to include all working-age persons (15 years and older) who are without work but were available and actively looking for a job in the last seven days prior to the time of interview.

2.1.6 Labour underutilisation

This is a combination of underemployment and unemployment, as well as persons who are not unemployed but exert some recognised pressure in the market (GSS, 2016). It reflects a condition of under usage of human capital endowment and resources which consequently undermine potential earnings of persons and at large economic growth and development.

2.1.7 Discouraged worker

A person is considered to be a discouraged worker if he or she is both without work and available to work but not actively looking for work.

2.1.8 Inactive or not economically active

A person is said to be inactive if he or she is neither employed nor unemployed. This includes students, the sick, discouraged workers, as well as, the retirees/pensioners, among others.

2.1.9 Labour force, participation rate and employment-to-population

Labour force, also termed economically active population, is the sum of the employed and unemployed. Based on this, the labour force participation rate is simply the proportion of the working-age population that forms the labour force. The employment-to-population is defined as the proportion of the working-age population that is employed.

2.1.10 Size of enterprise: Micro, small, medium and large enterprises

There is no universally accepted definition of firm size (Abor & Quartey, 2010). Previous studies have however relied on firm's employees, asset and turnover to define the size of a firm (Abor &

Quartey, 2010). Following the United Nations Industrial Development Organisation (UNIDO), GSS and the World Bank, the study defines firm size based on the number of employees. A *micro enterprise* is defined to include businesses that employ less than 5 employees. A s*mall enterprise* employs 5 to 19 employees while a *medium enterprise* employs 20 to 99. A *large enterprise* employs at least 100 employees. These classifications imply that all business that are owned by an own-account fall under a micro enterprise definition while those owned by employers can fall within any of the classifications. Therefore, an attempt is made to re-define micro enterprises into two, namely, own-account (or very micro) and small micro enterprises. In the case of an own-account enterprise, the owner is the only worker while small micro enterprise implies a firm that employs 1 to 4 employees. This distinction is very useful as own-account workers are deemed to be vulnerable (GSS, 2014; ILO, 2018).

2.1.11 Formal and informal enterprises

Following GSS and World Bank, the study defines formal enterprises to include all businesses that have registered with the Registrar General Department while informal enterprises fall outside such formal registration.

2.1.12 Youth

Depending on the data source, youth is defined in two ways. According to the ILO, persons of 15 to 24 years are regarded as youth. However, in the Ghanaian context, the GSS considers all persons within the age bracket of 15-35 to be youth.

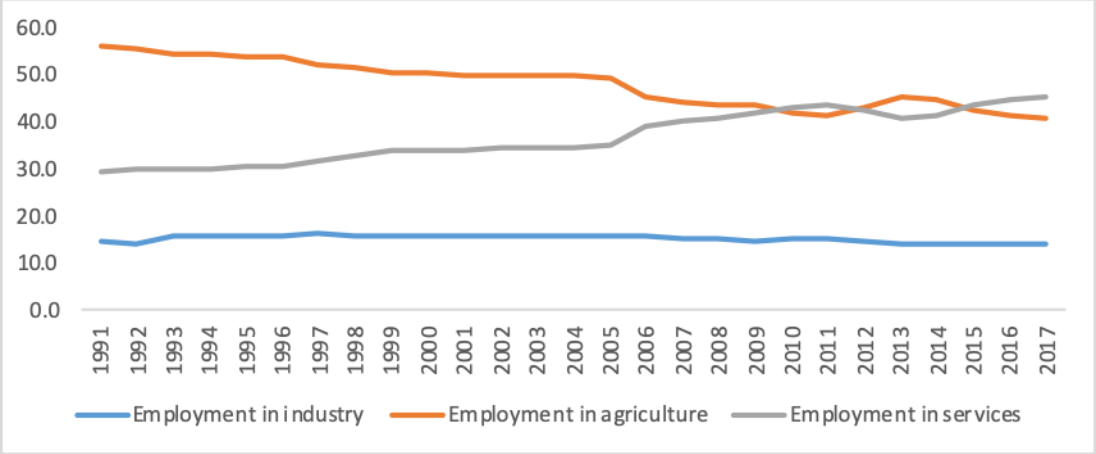
2.2 The Ghanaian labour market: Some structural changes

2.2.1 Sectoral contribution to employment

The Ghanaian economy has been experiencing some structural changes in its sectoral contributions to employment. The contribution of agriculture to employment has fallen over the years. However, it maintains its position as the leading employer of the rural population (GSS, 2014). Specifically, between 1991 and 2005, the agricultural sector employed around 50% or more of Ghanaian workers while employment share in the service sector remained between 29% and 35% (Figure 2.1). However, the share of agriculture in employment declined from 56% in 1991 to 49% and 40.6% in 2005 and 2017 respectively while that of services increased from 29.5% to 35.2% and 45.2% respectively within the same periods under discussion. On the other hand, the share of the industry sector in total employment has remained nearly unchanged over the years, hovering around 14% to 16% since 1991.

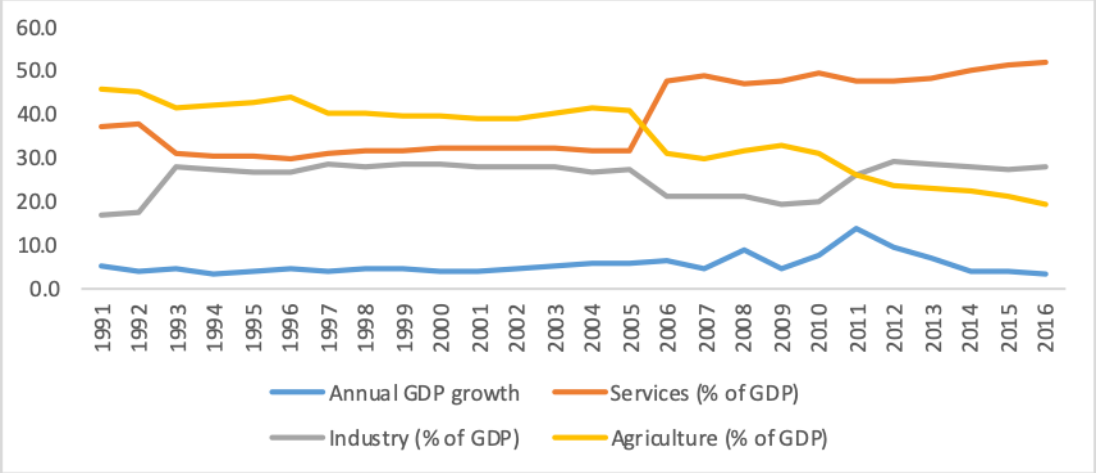
These sectoral changes in the labour market are largely consistent with the recent changes in sectoral contribution to the country's economic growth. More specifically, prior to 2006, the agricultural sector reported the highest contribution to gross domestic product (GDP) with services and industry reporting the second and third largest shares, respectively (Figure 2.2). However, since 2006, the services sector has remained the major contributor to GDP while the industrial sector has now overtaken the agricultural sector since 2012. For instance, between 2011 and 2016, the contribution of services to GDP averaged around 49.5% while that of industry and agriculture averaged around 27.9% and 22.6%, respectively.

Figure 2.1 Sectoral contributions to total employment (%), between 1991 and 2017



Source: Author's own computation from World Bank (WB) World Development Indicators (WDI), 2018

Figure 2.2 Sectoral contributions to GDP, between 1991 and 2016



Source: Author's own computation from World Bank (WB) World Development Indicators (WDI), 2018

2.2.2 Economic activities of Ghanaian workers: Industry and occupation

Evidence points to some differences in worker's industry of work and occupation by gender and location. Regarding workers' main industry of work, a higher fraction of females than males is engaged in manufacturing and trading activities while the fraction of males engaged in agricultural and construction activities exceeds that of females (Table 2.1). Expectedly, a higher

fraction of rural workers is primarily engaged in agricultural related activities while urban workers dominate in non-farm activities. In terms of secondary industry activities, the data reveals a much higher proportion of rural than urban workers engaged in manufacturing (Table 2.2). Be it main or secondary industry, it is observed that between 2005/06 and 2016/17 the proportion of workers engaged in agricultural and manufacturing activities declined in favour of mining related activities, construction and other services rose within the same period. The share for trading (wholesale and retail) activities increased and decreased for main and secondary industries, respectively. Between 2005/06 and 2016/17, the rural economy reported increasing proportions of workers in non-farm main industry activities, apart from manufacturing.

Tables 2.3 and 2.4 respectively present information on main and secondary occupations of workers for the period 2005-2017. The data points to some improvement in the quality of work. Regarding the main occupation, the country reported an increase in skilled workers including professionals, managers and clericals. The fall in the share of agricultural workers is largely due to a substantial fall in the share of subsistence agricultural workers; however, there has been an increase in the proportion of market-oriented skilled agricultural workers (including field and tree crop farmers) (GSS, 2008, 2014). Over the period, the share of elementary occupation remained nearly unchanged for the rural economy but increased marginally for the country at large; on the other hand, the urban economy reported a fall in the share of elementary occupation. The proportion of workers who engage in elementary work as their main occupation declined by almost half for females (from 8.5% to 4.5%) but increased for males. A higher percentage of males than females and urban than rural workers is engaged in skilled and craft related works. A higher proportion of urban than rural workers and females than males is engaged in services and sales, as well as plant and machine operation and related works.

Regarding secondary occupation, the data reports a similar share of workers in services and sales among rural and urban economies but a higher share among females than males. A higher fraction of rural than urban workers is involved in craft and related work as a secondary job. Regardless of gender and location, the shares for craft and related work reported a decline over the period, 2005-2017. Participation in skilled secondary occupation remains relatively higher among urban than rural economies and males than females. The urban economy reported a higher share of workers in agricultural work than rural economy in 2005/06 while in 2016/17, the latter reportedly a slightly higher proportion than the former. Similar to main occupation, the data for secondary occupation reports a fall in the share of elementary occupation and this is regardless of gender and location.

Table 2.1 Main industry of the employed aged 15 years and older, by location and gender (%)

	2005/06					2016/17				
Main industry	**Rural**	**Urban**	**Male**	**Female**	**Ghana**	**Rural**	**Urban**	**Male**	**Female**	**Ghana**
Agriculture, forestry and fishing	78.4	20.4	66.0	56.6	61.0	71.6	14.3	51.9	43.4	47.3
Mining, quarrying and utilities	0.6	1.5	1.4	0.4	0.8	1.3	1.5	2.4	0.5	1.4
Manufacturing	8.0	16.1	7.2	13.2	10.4	4.8	11.3	5.2	9.6	7.5
Construction	0.7	3.1	2.8	0.1	1.4	1.9	4.6	6.3	0.3	3.1
Wholesale and retail trade services	6.7	29.6	6.6	19.6	13.5	7.4	28.3	8.3	23.0	16.3
Other services	5.8	29.4	16.0	10.1	12.9	12.9	40.0	25.8	23.1	24.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's own computation from GLSS5 and GLSS7

Table 2.2 Secondary industry of the employed aged 15 years and older, by location and gender (%)

	2005/06					2016/17				
Secondary industry	**Rural**	**Urban**	**Male**	**Female**	**Ghana**	**Rural**	**Urban**	**Male**	**Female**	**Ghana**
Agriculture, forestry and fishing	43.4	56.7	55.1	39.6	46.3	45.6	44.4	51.8	39.8	45.3
Mining, quarrying and utilities	0.8	0.6	1.3	0.4	0.8	1.0	1.0	1.7	0.4	1.0
Manufacturing	25.5	12.6	15.0	28.6	22.7	15.6	8.9	10.2	16.6	13.7
Construction	0.6	0.8	1.5	0.0	0.7	3.4	2.2	5.8	0.8	3.1
Wholesale and retail trade services	22.0	18.4	14.8	26.1	21.2	17.8	19.8	10.3	25.1	18.4
Other services	7.7	11.0	12.3	5.4	8.4	16.7	23.6	20.3	17.3	18.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's own computation from GLSS5 and GLSS7

Table 2.3 Main occupation of the employed aged 15 years and older, by location and gender (%)

	2005/06					2016/17				
Main occupation	**Rural**	**Urban**	**Male**	**Female**	**Ghana**	**Rural**	**Urban**	**Male**	**Female**	**Ghana**
Skilled workers (Professionals, managers, etc.)	2.5	16.1	9.6	4.0	6.6	4.4	15.7	13.1	5.8	9.2
Service and sales workers	5.7	25.5	5.3	17.1	11.6	17.7	54.4	21.8	43.1	33.3
Skilled agricultural, forestry and fishery workers	76.5	19.6	63.5	55.8	59.4	70.4	14.0	50.7	43.0	46.5
Craft and related trades workers	9.0	21.0	10.5	14.5	12.6	2.6	6.8	5.3	3.6	4.4
Plant and machine operators/assemblers	1.5	6.3	6.2	0.2	3.0	0.7	1.8	2.4	0.1	1.2
Elementary occupation	4.8	11.5	5.0	8.5	6.9	4.3	7.2	6.7	4.5	5.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's own computation from GLSS5 and GLSS7

Table 2.4 Secondary occupation of the employed aged 15 years and older, by location and gender (%)

	2005/06					2016/17				
Secondary occupation	**Rural**	**Urban**	**Male**	**Female**	**Ghana**	**Rural**	**Urban**	**Male**	**Female**	**Ghana**
Skilled workers (Professionals, managers, etc.)	3.3	4.9	6.8	1.2	3.6	2.0	4.8	4.9	1.1	2.8
Service and sales workers	16.0	15.0	12.4	18.3	15.8	38.9	39.2	27.1	48.9	39.0
Skilled agricultural, forestry and fishery workers	41.7	55.9	52.8	38.7	44.8	46.0	43.1	50.5	40.8	45.2
Craft and related trades workers	26.5	12.8	14.9	30.1	23.5	6.0	3.6	7.1	3.7	5.3
Plant and machine operators/assemblers	2.4	1.9	5.1	0.1	2.3	1.3	0.5	1.9	0.4	1.0
Elementary occupation	10.2	9.7	8.1	11.6	10.1	5.8	8.8	8.6	5.1	6.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's own computation from GLSS5 and GLSS7

2.2.3 Employment status, vulnerable employment, decent jobs and poverty incidence

Ghana's economic growth has not generated enough opportunities for decent employment. Between 1991 and 2005, the proportions of self-employment, vulnerable and paid employment remained relatively stable as compared to contributing family workers which exhibited some fluctuations (Figure 2.3a). Vulnerable employment still remains very high over the years, though declining recently. For instance, between the periods 1991 and 2005, vulnerable workers and self-employed accounted for averages of 79.7% and 85.2% respectively while contributing family workers, paid workers and employers reported averages of 12.3%, 14.8% and 5.5% respectively within the same periods.

Between 2005 and 2017, the shares for vulnerable workers and self-employed respectively declined from 79.4% to 66% and 85.0% to 73.1% as compared to contributing family workers, paid workers and employers which respectively increased from 10.9% to 23.1%, 15% to 26.9% and 5.6% to 7.1%. The fall in vulnerable employment is partly due to a reduction in own-account. For instance, between 2005/06 and 2012/13, own-account fell from 55% to 46.4% (GSS, 2008, 2014). While the rise in paid employment and employers point to a somewhat improvement in working condition that of the rise in contributing family workers remain a threat to policy makers.

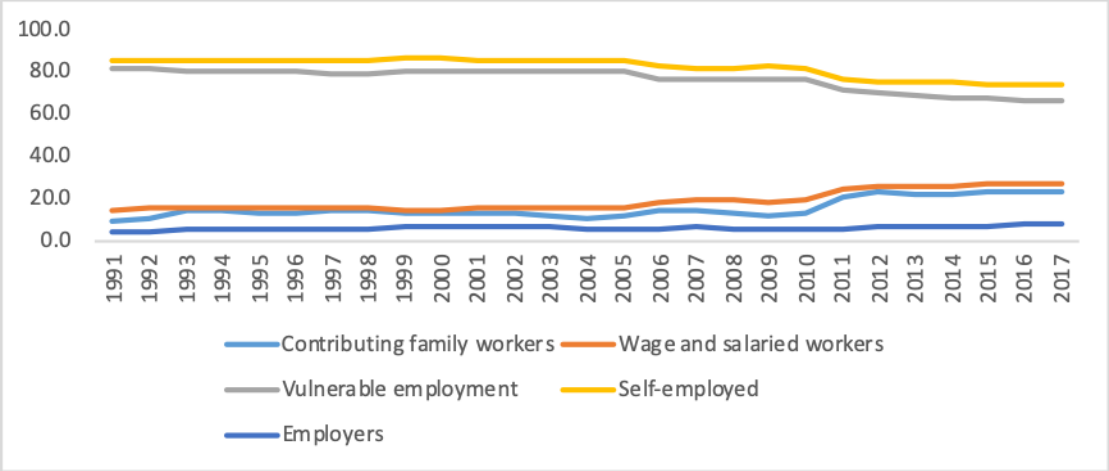
The large numbers of workers in vulnerable employment provide much support to the low and poor earning opportunities across the country (GSS, 2014, 2016). Workers with lower education and skills mostly find themselves in less productive economic activities. Lack of decent employment opportunities could even push many individuals with more education in vulnerable

jobs. A previous study on Ghana has argued that inadequate decent or quality jobs pose much threat to Ghanaian policy makers even than the problem of joblessness (sum of unemployed and inactive) (Honorati & de Silva, 2016). Data on Ghana reveal clear differences in earnings by gender, age and location (GSS, 2014, 2016; Honorati & de Silva, 2016). To be very specific, earning opportunities are found to be lower among women than men, youth than adult and rural than urban workers. Added to the above, a significant proportion of Ghanaian workers are not entitled to some fundamental social security incentives such as paid or holiday leave, sick or maternity leave, formal contract and subsidised medical care (GSS, 2014, 2016).

Figure 2.3b presents the incidence of poverty by the employment status of household heads between the period 2005 and 2017. Over this period, poverty incidence is found to be greatest (more than 40%) among households that are headed by agricultural self-employed persons but least for those headed by a retired person. Comparing households headed by public and private employees, poverty is found to be lower among the former than the later. Households that are headed by non-agricultural (non-farm) self-employed persons are relatively characterised by lower incidence of poverty than those headed by unemployed and other non-economically active persons. Between 2005 and 2017, the incidence of poverty among households headed by unemployed persons increased by percentage points of 9.4 but declined for the remaining groups of employment status. In the most recent year, 2016/17, the data reported a relatively lower incidence of poverty among non-agricultural self-employed households than their counterparts headed by private employees. This seems to confirm some previous argument on the important role of non-farm employment towards poverty reduction in Ghana, particularly for the rural economy (Senadza, 2011; Ackah, 2013). In the same line, the statistics, however, provides some

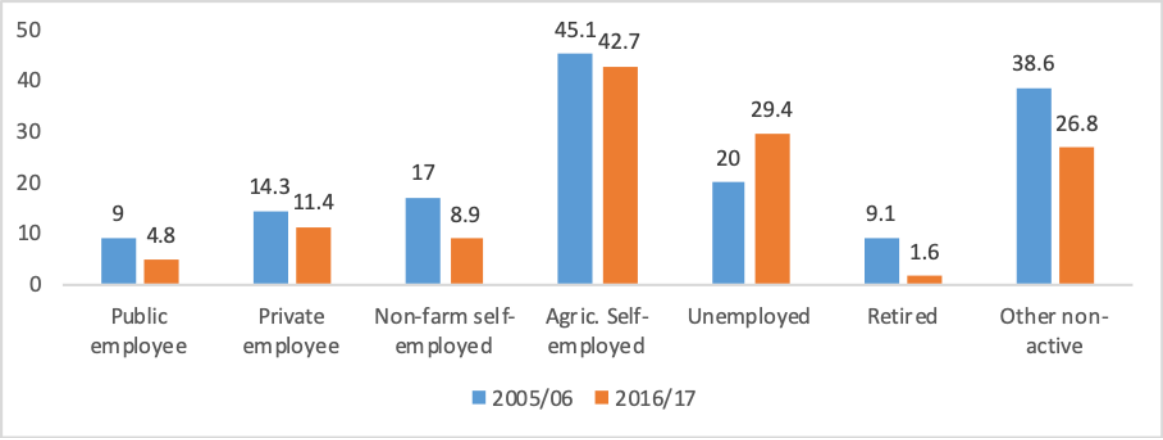
evidence of a higher incidence of poverty in the Ghanaian economy, particularly among households which are headed by agricultural self-employed, unemployed and other groups of the inactive other than the retired (GSS, 2008, 2014, 2018).

Figure 2.3a Employment status between 1991 and 2017



Source: Author's own computation from World Bank (WB) World Development Indicators (WDI), 2018

Figure 2.3b Incidence of poverty, by the employment status of household heads between 2005 and 2017 (%) (Using the upper poverty line of GHC 1,314)



Sources: GSS (2018) report on poverty trends in Ghana between 2005 and 2017

2.2.4 Labour underutilisation: Unemployment and time-related underemployment

Over the years, the country has increased in its average labour force participation rate and employment-to-population ratio with the former being higher than the latter (Figure 2.4). These averages are higher for women than men. Among others, larger labour force and population generally emerge with the issues of unemployment and underemployment (GSS, 2014; ILO, 2018).

In terms of unemployment, Figure 2.5 provides some trends over the past decades. The unemployment rate increased steadily from the early 1990s until it reached its peak around 10% in 2000. However, from 2001 to 2006, the unemployment rate reported a steady decline and this among others can be due to the improvement in the country's economic growth within the same period. Nevertheless, the country could not sustain this gain as the unemployment rate rose gradually from 3.3% in 2006 to 5.3% in 2010 before declining in 2013. Since 2013, the unemployment rate for Ghana has virtually flattened around 2.4%. This could be attributed to some observed structural changes (see Figure 2.1). Thus, the shares of services and agriculture in GDP generally fluctuated in a similar opposite direction while that of industry remained unchanged since 2013. On the net, the country's growth could not generate the sufficient employment opportunities to reduce the rate of unemployment within this period. While unemployment rates for men and women have followed similar trends, women reported relatively higher rates than men over the years.

A major challenge in Ghana is youth unemployment which is reported to be much higher among secondary school leavers and tertiary graduates (Baah-Boateng, 2013; GSS, 2014, 2016). The

data shows a higher unemployment rate among the youth than the national rate (Figure 2.6). Based on ILO definition of youth (15-24 years), the unemployment rate among the youth rose from around 9.1% to 19.9% between 1991 and 1999 but declined to a low figure of 7.2% in 2006. Similar to the national level, youth unemployment reported a rise between 2006 and 2010 but fell in 2013 and has since remained flatter at almost 5%. Just like the national unemployment rates for men and women, youth unemployment is reported to be relatively higher among women than men.

Many reasons can be cited to explain these patterns of unemployment including the low levels of formal education, skills training and working experience, among others. For instance, more than 50% of the Ghanaian population aged 15 years and older are said to have never completed basic education (GSS, 2014). Relatedly, evidence shows that formal educational qualification continues to remain lower among women than men (GSS, 2008, 2014, 2016). It has been argued that while women have recently increased their participation in the labour market than some decades ago, they are somehow faced with limited job opportunities in the country (Baah-Boateng, 2012, 2013). By comparing the adult and the youth, the latter is often characterised with lack of or inadequate working experience and social capital which seem to remain key barriers in accessing formal employment in addition to formal education (Baah-Boateng, 2013).

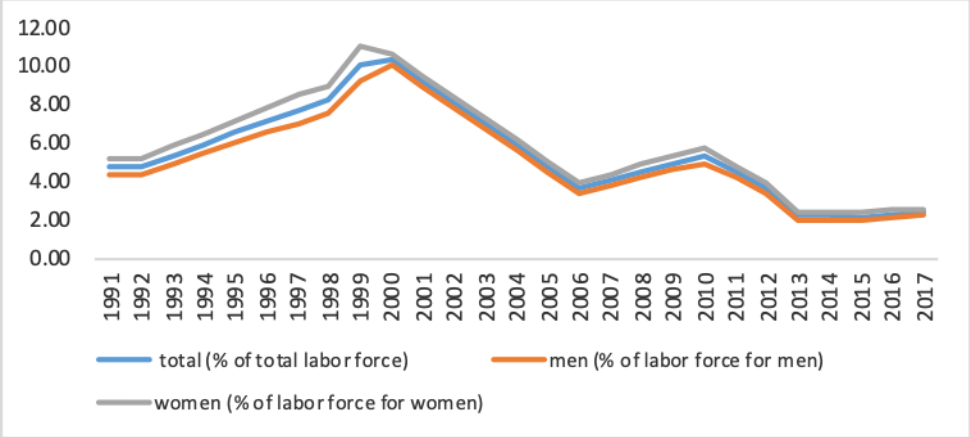
Regarding time-related underemployment, a report by the Ghana Statistical Service indicates that one in every ten (10%) of the employed are deemed underemployed, repressing around 955,529 workers (GSS, 2016). Of this, the rural economy reported a higher fraction (58.7%) than the urban economy (41.3%). The report shows similar percentages of underemployment for men and

women (49.3% and 50.7%, respectively). Most of the Ghana's underemployed are reported to be located in the Northern region followed respectively by Upper East and Greater Accra regions. Underemployment is found to be relatively higher among the adult population (58%) than their youth counterpart (40.2%).

Figure 2.4 Labour force participation rate and employment-to-population ratio (%), by gender

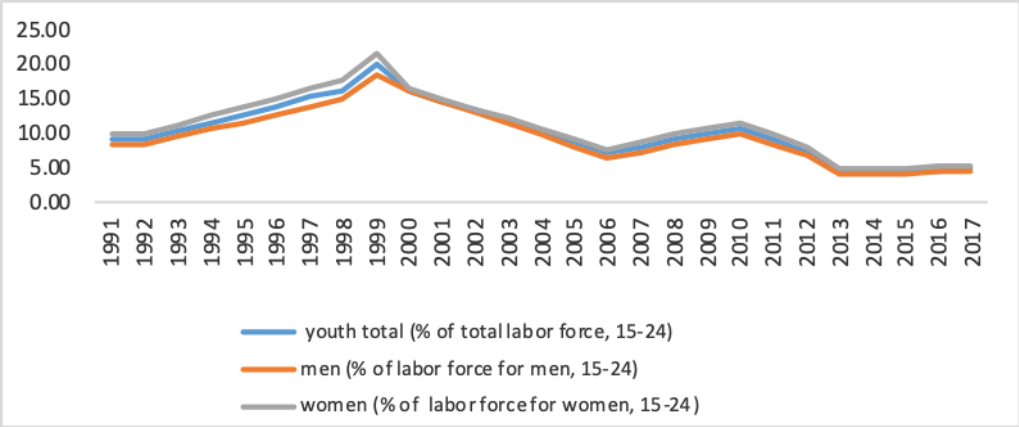
Source: Author's own computation from World Bank (WB) World Development Indicators (WDI), 2018

Figure 2.5 Overall unemployment rate (%), by gender



Source: Author's own computation from World Bank (WB) World Development Indicators (WDI), 2018

Figure 2.6 Youth unemployment rate (%), by gender



Source: Author's own computation from World Bank (WB) World Development Indicators (WDI), 2018

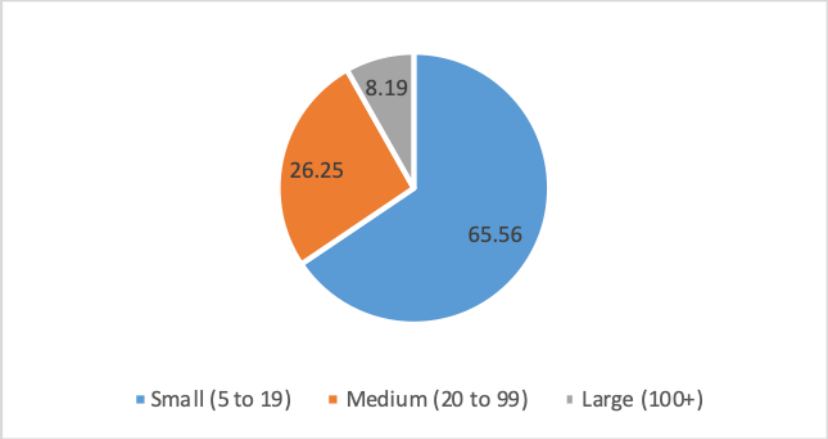
2.2.5 Formal and informal enterprises: Job creation

The Ghanaian labour market is primarily dominated by micro and small enterprises. Data from the World Bank enterprise surveys for formal and informal enterprises provide much support to this statement. Regarding formal enterprises, more than half (65.6%) are considered to be small enterprises and this is followed by medium and large enterprises, representing 26.3% and 8.2%, respectively. In terms of informal enterprises, the data point to the dominance of micro enterprises, accounting for around 94% with very few being small. Within the micro informal enterprise classification, those that are without any employee (own-account or very micro enterprises) reported a similar share as those employing 1 to 4 employees (small micro), each accounting for approximately 47%.

Job creation by micro and small enterprises has not been very encouraging in recent times. First, regarding job creation by formal enterprises, Table 2.5 indicates that between firms' inception or start-up and 2012, the few large enterprises contributed more to the creation of permanent and temporal jobs followed by medium and small enterprises, respectively. Within the same periods,

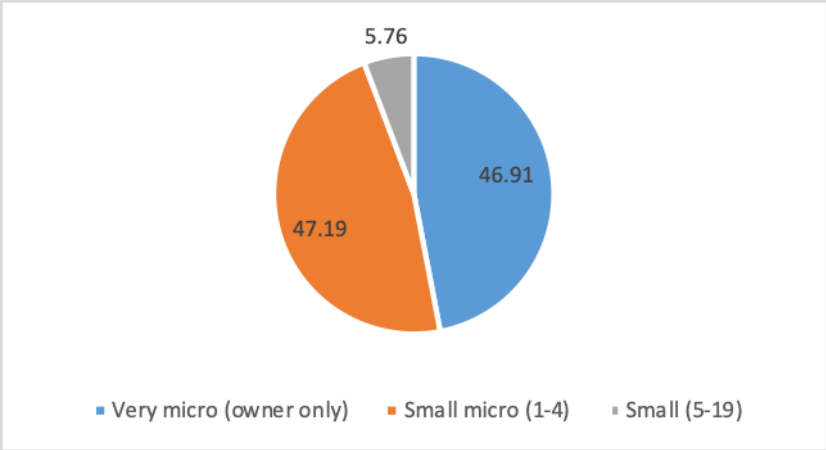
the share of large enterprises in total job creation increased by 17.6 percentage points while that of small and medium enterprises declined by 11.3% and 6.3% percentage points, respectively. However, by focusing just on permanent job creation by formal enterprises, the data report a fall for each classification of firm size between 2010 and 2012 (Table 2.6). Second, regarding informal enterprises, the data show that between firms' inception (start-up) and 2013, both small micro and small enterprises reported a positive job creation while own-account enterprises (very micro) rather reported a fall (Table 2.7). Within the same periods, the shares of total jobs created by small micro and small informal enterprises increased by 4.5 and 6.3 percentage points respectively while that of own-account informal enterprises fell by 10.7% percentage points.

Figure 2.7 Size of formal enterprises in 2012 (%)



Source: Author's own computation from
World Bank (WB) Formal Enterprise survey, 2013

Figure 2.8 Size of informal enterprises in 2013 (%)



Source: Author's own computation from
World Bank (WB) Informal Enterprise survey, 2013

Table 2.5 Creation of permanent and temporal employment between start-up and 2012, by the size of formal enterprise

	Year				Difference	
	Inception/start-up		2012		Inception to 2012	
Size	Number	Share (%)	Number	Share (%)	Number	Share (%)
Small (5-19)	2567	33.27	5246	22.01	2679	-11.27
Medium (20-99)	2641	34.23	6657	27.92	4016	-6.31
Large (100 +)	2507	32.50	11936	50.07	9429	17.57
Total	7715	100	23839	100	16124	---

Source: Author's own computation from World Bank (WB) Formal Enterprise survey, 2013

Table 2.6 Creation of permanent employment between 2010 and 2012, by the size of formal enterprise

	Year				Difference	
	2010		2012		2010-2012	
Size	Number	Share (%)	Number	Share (%)	Number	Share (%)
Small (5-19)	4223	17.97	3633	18.99	-590	1.02
Medium (20-99)	6823	29.04	5526	28.89	-1297	-0.15
Large (100 +)	12448	52.98	9969	52.12	-2479	-0.87
Total	23494	100	19128	100	-4366	---

Source: Author's own from computation World Bank (WB) Formal Enterprise survey, 2013

Table 2.7 Creation of employment (paid and unpaid) between start-up and 2013, by the size of informal enterprise

	Year				Difference	
	Inception/start-up		2013		Inception to 2013	
	Number	Share (%)	Number	Share (%)	Number	Share (%)
Very micro (owner only)	407	31.02	328	20.28	-79	-10.74
Small micro (1-4)	692	52.74	925	57.20	233	4.46
Small (5-19)	213	16.23	364	22.51	151	6.28
Total	1312	100	1617	100	305	---

Source: Author's own computation from World Bank (WB) Informal Enterprise survey, 2013

2.2.6 Constraints to enterprise employment generation/creation

The inability of enterprises, particularly those that are micro and small in size, to expand in Ghana has been due to numerous factors. Access to finance remains the largest obstacle facing many Ghanaian businesses (GSS, 2008, 2014; Honorati & de Silva, 2016; Ackah et al., 2017). Many potential entrepreneurs face the challenge of start-up capital or lack the required collateral to access formal credit (GSS, 2014, 2016). Informality hinders many enterprises from acquiring bank loan. This pushes many micro businesses to rely largely on their own savings. To support this statement, a previous report on household non-farm enterprises indicate that household savings account for as much as 73% of total sources of capital and this is followed by assistance from family members and friends (14.6%) with bank loan accounting for just 1.9% (GSS, 2014). Aside credit, Ghanaian entrepreneurs view unreliable electricity followed respectively by tax rates and corruption to be major hindrances to their business operations (Honorati & de Silva, 2016).

2.3 Chapter summary

The chapter analysed some structural changes in Ghana's labour market. The analysis revealed the dominance of vulnerable employment over the years. However, there is some recognised increasing proportion of workers engaged as paid employees and employers. The contribution of agricultural sector to total employment has fallen over the years in favour of services. Comparatively, unemployment seems to be higher among women than men and youth than adults. Urban workers are much involved in agricultural activities as compared to the dominance of non-farm activities among urban workers. Nevertheless, the analysis points to increasing fractions of rural and urban workers being involved in non-farm and agricultural activities, respectively. From the time of business inception, large enterprises have contributed to creating more formal jobs than small and medium enterprises. In the same vein, among informal enterprises, job creation was recognised to be higher for small micro and small enterprises than own-account (or very micro) enterprises. In general, the ability of enterprises to create more jobs has fallen over the years. This has been attributed to diverse constraints facing Ghanaian enterprises. These constraints, among others, included poor access to credit, unstable electricity supply, tax rates and a high incidence of corruption.

CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

This chapter presents the literature review for the study. It is organised into four sub-sections. Though the review generally cuts across some issues, the first and second sub-sections are, however, much related to empirical chapter 4 of the thesis while the third sub-section provides a much related literature review for chapters 5 and 6. Specifically, the first sub-section of this chapter provides a review of occupational choice theories where some theoretical background regarding employment decisions in the labour market are discussed. The second sub-section initially presents the argument for the use of consumption as a better proxy for household welfare in a developing country context before delving into some empirical evidence on the determinants of welfare and inequality gaps between rural and urban households.

On the other hand, the third sub-section of the chapter focuses on rural diversification, its determinants and welfare implications. It begins with the concept or theory of diversification regarding why individuals and their households may want to rely on diversified income sources and employment activities, among others. This is then followed by some empirical findings on the determinants and welfare implications of diversification. While the former focuses on the role of household socio-economic and community characteristics in explaining diversification the latter is concerned with the effects of diversification on agricultural productivity, poverty and inequality. The last sub-section concludes this chapter.

3.1 Occupational choice theories

Most theories of occupational choice argue that the decision to be in a particular employment will depend on the expected utility to be derived from such decision (Eisenhauer, 1995; Douglas & Shepherd, 1999; Hamilton, 2000; Tamvada, 2010). A clear linkage is established between these theories and worker's employment status. While the former involves a utility maximization process the latter measures that actual outcome of the decisions that individuals or households make to maximize their utility or satisfaction. Put differently, employment status – defined as the position or status of the worker in the work he/she does (see section 2.1.2) – is primarily an observable outcome of these theories which are generally based on the concept of utility maximization. From the expected utility theory, individuals will choose to become a self-employed over being a wage earner (or employee) if the expected return or satisfaction from the former exceeds the latter. The implication is that if individuals express a higher desire for self-employment but lack the start-up capital, then in an attempt to maximise their utility, they may accept a temporary wage offer than to stay unemployed or inactive (Douglas & Shepherd, 1999).

In the literature, returns to employment are generally grouped into two: pecuniary and non-pecuniary benefits (see Duncan, 1976; Hamilton, 2000; Blanchflower & Oswald, 1998, 2001, 2004, 2008; Hughes, 2006). These benefits may differ between wage employment and self-employment. To the wage earner, the pecuniary benefits may cut across wages, salaries, bonuses, and other measurable benefits while the non-pecuniary benefits may cover incentives such as subsidised medical care, sick and paid leaves (Duncan, 1976; Honorati & de Silva, 2016; ILO, 2018). On the other hand, the pecuniary benefits of the self-employed may cut across profits and other measurable returns while non-pecuniary benefits may cover issues of autonomy and independence (Cooper & Artz, 1995; Hamilton, 2000; Blanchflower, 2000, 2004; Blanchflower

& Oswald, 1998, 2004; Clark, 1997, 2006; Hughes, 2006). Generally, a wage earner is often considered to be offered with better pecuniary benefits relative to the self-employed (Honorati & de Silva, 2016; ILO, 2014a, 2018). Studying on the United States of America, Hamilton (2000) finds higher earnings among wage workers than self-employed but concluded of higher non-pecuniary benefits for the latter than the former.

Another school of thought (Baumol, 1990; Holmes & Schmitz, 1990; Gifford, 1993; Lazear, 2005) is of the opinion that individuals with greater skills and abilities rather end up establishing their own businesses. In this same line of argument, Banerjee and Neuman (1993) and Dabla-Norris et al. (2008) have classified individuals into different groups based on their respective productive skills or capacity. They argue that the most productive individuals often choose to become employers (self-employed with employees or entrepreneurs) while the next productive ones become own-account (self-employed without employees). According to them, the least productive ones rather end up being employees including wage earners, the unpaid worker, as well as those engaged at the subsistence level. The implication is that if employers are comparatively more productive and skilful, then they are more likely to also receive higher returns than wage earners and other groups of workers. Consequently, employers are predicted to contribute higher to household welfare, followed by the own-account and employees. Another implication is that a person's level of formal education plays some critical role in enhancing other aspects of human capital including skills and training. Thus, education increases a person's employable skills and serves as a tool to be better informed to make the right economic decisions and benefit from better employment opportunities, which consequently lead to a higher earning and general well-being or welfare of the household.

Additionally, individuals' employment decisions depend largely on the environmental conditions prevailing in the economy (see Schumpeter, 1934; McMillan & Woodruff, 2002; Hughes, 2006; Walker & Webster, 2007; Saradakis et al., 2014; Ackah et al., 2017). For instance, push factors such as frustration from previous job, inadequate wage employment and weak labour laws may force individuals to set up their own businesses. On the other hand, pull factors such as available credit facilities, new technology, favourable institutions and higher education provide individuals with better market opportunities to own a business.

3.2 Rural and urban household welfare

3.2.1 Consumption: An appropriate measure of welfare in a developing country context

Different objective measures of welfare (or well-being) exist in the literature (Tinbergen, 1991; Wodon, 2000; Slesnick, 1998, 1994, 2001; Wan, 2004; Duclos & Araar, 2006; Deaton & Zaidi, 2002; Deaton, 2008;; Hayashi et al., 2014). Researchers have, however, debated over what should be the appropriate indicator of objective welfare. Two main strands of the literature have emerged, namely, income and consumption measures of welfare. In most developing economies, consumption is argued to be a close measure of welfare due to its less variability as compared to income which suffers from seasonal variations and under reporting (Duclos & Araar, 2006; Chang, 2012; Deshpande & Sharma, 2016). Relative to income measure of welfare, the consumption approach clearly captures a common practice in Ghana and most African economies where a typical household consumes a significant part of goods and services that are produced by members of the household (Duclos & Araar, 2006; GSS, 2014). In Ghana, for instance, households that engage in subsistence agriculture primarily consume at most all the crops and animals they produce in order to secure their consumption patterns (GSS, 2008, 2014).

Households that save or invest a substantial fraction of their income will report lower consumption expenditures. Nevertheless, given the low savings and investment rates in many developing nations (including Ghana), consumption may still serve as a good proxy for welfare. Most households even rely on savings and borrowings to maintain some minimum level of consumption (Duclos & Araar, 2006). While studies on developed economies (see Borjas & Bronars, 1989; Hamilton, 2000; Fields, 2003) have largely relied on the income approach, some recent studies on developing nations have rather employed a consumption approach (Nguyen et al., 2007; Tamvada, 2010; Agyire-Tettey et al., 2018).

3.2.2 Empirical evidence of rural-urban household welfare and inequality gaps

Many factors have been established to influence economic well-being (Nguyen et al., 2007; Tamvada, 2010; Thu Le & Booth, 2014; Deshpande & Sharma, 2016). For instance, a much detailed analysis of employment status by Tamvada (2010) reveals a higher consumption welfare effect of self-employment with employees (employers) than self-employment without employees (own-account) (Tamvada, 2010). Comparing employers with formal employees, Tamvada (2010) finds higher returns to the former than the latter. Some studies have established a strong linkage between household welfare and human capital development. In particular, a higher education is found to exert a greater positive influence on welfare than no or less education (Nguyen et al., 2007; Tamvada, 2010; Agyire-Tettey et al., 2018). Other individual and household characteristics including age, gender, household size, dependency ratio and non-labour income tend to also influence the economic well-being of a typical household (Nguyen et al., 2007; Tamvada, 2010; Deshpande & Sharma, 2016).

Recent studies seem to pay much attention to analysing rural-urban household welfare disparities (Nguyen et al., 2007; Go et al., 2007; Thu Le & Booth, 2014; Agyire-Tettey et al., 2018). A consistent finding in the literature is that urban households tend to have a significantly higher welfare than their rural counterparts (see, for instance, Nguyen et al., 2007; Thu Le & Booth, 2014; Agyire-Tettey et al., 2018). In the same line, studies that relied on quantile analysis have even shown evidence of differential rural-urban disparities across the distribution of household welfare (Agyire-Tettey et al., 2018; Nguyen et al., 2007; Thu Le & Booth, 2014). For instance, Agyire-Tettey et al. (2018) found the rural-urban inequality gap to be larger at the lower quantiles (among poorer households) while Nguyen et al. (2007) and Thu Le and Booth (2014) found the disparity to be rather higher at the more upper quantiles (among richer households). A clear insight on rural-urban inequality gaps remains very crucial as such disparities are argued to explain total inequalities particularly among countries in the developing world (Nguyen et al., 2007; Go et al., 2007).

In the literature, sources of inequality gaps have been classified largely into two components, namely, endowment (or characteristics) and structural (or returns) effects (see Oaxaca, 1973; Blinder, 1973; Fortin et al., 2010, 2011). Simply, endowment effect is the part of inequality gap that is due to differences in observable characteristics while returns effect account for differences in returns to observable characteristics (Oaxaca, 1973; Blinder, 1973; Nguyen et al., 2007; Go et al., 2007; Fortin et al., 2011; Thu Le & Booth, 2014). Findings on these issues are however mixed in the literature on rural-urban welfare disparities (Nguyen et al., 2007; Thu Le and Booth, 2014; Agyire-Tettey et al., 2018). For example, a study on Vietnam's rural-urban inequality by Nguyen et al. (2007) for the periods 1993 and 1998 found both effects to be stronger at the upper

welfare quantiles. However, between the two periods, Nguyen et al. (2007) realised a much increase in endowment and returns effects at the lower and upper quantiles, respectively. These findings are consistent with a recent study on Vietnam by Thu Le & Booth (2014) which analysed the same issues but for the periods between 1993 and 2006. A study on Malawi by Chirwa and Matita (2009) largely attributed rural-urban welfare gaps to endowment effect while Ndoye (2015) on Senegal and Agyire-Tettey et al. (2018) on Ghana rather attributed the gaps to returns effect.

Among the factors that contribute to explaining rural-urban inequality gaps, Nguyen et al. (2007) found education, ethnicity and farm employment to be key variables while Thu Le and Booth (2014) found variables such as education, age, employment and remittances to be very important with education having the greatest effect. In the same line, Agyire-Tettey et al. (2018) found education, wage employment, dependents and household size to be key factors in explaining rural-urban inequality gaps.

3.3 Rural diversification and welfare implications

3.3.1 The diversification theory

The wide spread of diversification among many rural households in the developing world has attracted the interest of many researchers and policy makers across the globe. Broadly, individuals and their households embark on different strategies including diversification into different assets, income sources and employment activities to improve their livelihoods (Reardon et al., 1994; Ellis, 1998, 2000; Barrett et al., 2001; Ackah, 2013). The existing literature has addressed and classified the motives of diversification among these individuals and their

households into two: namely, push and pull factors (Norman, 1974; Sahn, 1989; Reardon et al., 1994; Jalan & Ravallion, 1998; Barrett et al., 2001; Démurger et al., 2010). While the former is necessity driven that of the latter can be classified as opportunistic in nature. More simply, push factors are those that force individuals and households to choose different portfolios of employment or economic activities in order to lessen any potential or anticipated risk in the future (Barrett et al., 2001; Démurger et al., 2010; Ackah et al., 2017). This motive is a pure coping strategy that addresses the problem of income volatility for the purpose of smoothening households' consumption over time (Barrett et al., 2001; Démurger et al., 2010). Among others, these push factors cut across issues such as inadequate credit, land tenure problems, low human capital (including low education and skills), poor infrastructure and unreliable weather conditions that adversely influence households' consumption through low productivity and earnings.

Apart from the aforementioned, other push factors such as large family size and dependency ratio increase households' burden and may force them to diversify into or settle for less lucrative opportunities that provide them with some minimal level of earnings, consumption and general well-being. Regarding age structure, the youth is generally considered to be with little working experience and limited start-up capital which may consequently force them into less fruitful diversification activities compared to the adult group. Diversification strategies of agents including individuals and households are often influenced by structural variables such as religion, ethnicity, marriage and geographical locations which subsequently lead to welfare differentials. Implicitly, these structures sometimes explain the role that culture and social norms play, for instance, in understanding gender roles in household chores and market work.

In contrast, pull factors create conducive atmosphere or market opportunities for the emergence of profitable or lucrative employment activities (Barrett et al., 2001; Démurger et al, 2010; Senadza, 2011; Ackah, 2013; Ackah et al., 2017). These factors cut across available and affordable credit facilities; improved human capital (such as high education and skills) and physical capital endowment; increased demand for new and existing goods and services within and outside communities; closeness to market and business centres, towns or cities and construction sites; and other infrastructural development like roads, electricity, schools and hospitals (see Jalan & Ravallion, 1998; Barrett et al., 2001; Démurger et al, 2010; Ackah et al., 2017). These factors offer much flexibility and opportunities for people to either complement or substitute their existing employment activities with new or related ones (Norman, 1974; Barrett et al., 2001). Pull factors motivate households to diversify into high rewarding employment activities which largely impact on their welfare status as compared to push factors which force them to scatter their limited resources in order to secure a stable income and consumption pattern (Barrett et al., 2001; Démurger et al, 2010). Households that receive non-labour incomes including remittances and rents may escape the liquidity constraint which hinder most people from diversifying into varied and more rewarding employment opportunities. Nevertheless, this may not always hold, particularly for individuals and households that rely on such income sources for consumption rather than investment purposes.

Comparatively, developed economies are noted of pull factors while their developing counterparts are dominated by push factors (Hamilton 2000; Barrett et al., 2001; Démurger et al., 2010). Among others, this difference is largely attributed to the fact that developed nations are

governed by high quality institutions like the rule of law, property rights, stable political systems, favourable labour laws and prudent market systems relative to the less developed ones (Acemoglu et. al, 2001; Ahlerup et al., 2009; Fosu, 2002, 2012; Bates et. al, 2013). The literature argues that good institution reinforces the creation and sustainability of pull factors which consequently create a more rewarding and peaceful business environment towards entrepreneurial activities, employment generation and improved productivity, among others (Baumol, 1990; North, 1991; Aidis et al., 2008; Sobel, 2008; Bates et al., 2013; Dutta & Sobel, 2016). The implication is that to maximise the gains from alternative diversification strategies, policy makers in the developing world need to improve the existing market opportunities by changing or improving the prevailing formal and informal institutional environment (see Baumol, 1990; North, 1991; Acemoglu et. al., 2001).

3.3.2 Determinants and welfare implications of diversification

3.3.2.1 Determinants of diversification: Some empirical evidence

Different studies have attempted to analyse the factors that influence households' decision to diversify into different income sources or employment activities, particularly in the rural economy. Examples of these studies include de Janvry and Sadoulet (2001) on rural Mexico, Escobal (2001) on rural Peru, Smith et al. (2001) on rural Uganda, Démurger et al. (2010) on Northern China, Senadza (2010, 2012) and Ackah (2013) on rural Ghana and Akaakohol and Aye (2014) on rural Nigeria. For most of these studies, factors such as gender, education, landholdings and infrastructures (road, electricity, market, among others) tend to influence diversification among individuals and their households. The empirical findings on these issues are, however, conflicting or mixed. These mixed findings can largely be attributed to differences

in the definitions or measures of diversification used by different researchers. It could also be due to clear differences in countries' experiences, labour market conditions and, in general, development stages which consequently account for differences in the datasets used by previous authors. While this study uses specific datasets from Ghana, it thus addresses the former challenge by applying an improved measure of diversification (using entropy index) to examine the degree of employment diversification within each of and across the three major sectors (thus, agriculture, services and industry). Previous studies have primarily been concerned with the pattern of diversification without paying explicit attention to the extent or degree of such diversification process. In most of these studies, diversification has largely been limited to the non-farm income or participation in the non-farm sector. However, in recent times, rural households seem to diversify within a particular sector and or across different sectors. The rest of this section provides specific empirical evidence on the determinants of diversification.

Gender

There seems to be a disagreement among authors regarding gender differences and discrimination in the diversification literature (Newman & Canagarajah, 2000; Escobal, 2001; Senadza, 2010, 2012). For instance, prior evidence in rural Peru showed no evidence of gender difference (Escobal, 2001) while empirical findings on rural Ghana indicate that males and females are respectively more likely to be engage in agricultural and non-farm income generating activities (Newman & Canagarajah, 2000; Senadza, 2010). Other studies on Ghana have also claimed that female-headed households tend to generally receive a higher income from non-farm employment than their male counterparts (Senadza, 2012; Canagarajah et al., 2001). By disaggregating income into different sources, Sendaza (2012) argued that male-and female-

headed households respectively receive a greater fraction of their non-farm income from paid employment and self-employment.

Human capital

Prior evidence confirms the importance of human capital (skills, training and formal education) on the livelihood strategies of households and in particular, diversification into different earning opportunities (Ellis, 1998; Abdulai & CroleRees, 2001; Escobal, 2001; Babatunde & Qaim, 2009; Ackah, 2013; Senadza, 2011, 2012). Households with improved human capital endowment are better informed and stand a better chance of investing or diversifying into profitable activities relative to those with less human capital asset. Thus, an improved human capital increases the knowledge capacity and awareness of households to make the right decision. This assertion is supported by previous evidence that the highly educated persons are more likely to be engaged in self-employment, stable and high paid jobs (largely in the non-farm sector) while their less educated or uneducated counterparts end up in low earning or vulnerable jobs (Abdulai & CroleRees, 2001; Escobal, 2001). Nevertheless, the findings by Canagarajah *et al*. (2001) rather argued of an insignificant relationship between non-farm diversification and education.

Landholdings

Generally, landholding is expected to empower households to increase their participation in agricultural employment and some non-farm earning activities (Senadza, 2010, 2012; de Janvry and Sadoulet, 2001; Reaedon et al., 2006). In the rural setting, landholdings remain a major component of household asset. With a larger land size, a number of people from a typical household can be engaged in a similar or differentiated crop farming and animal production. Apart from direct farming, landholdings also increase households' wealth through renting and

leasing activities and sometimes a complete sale of the land. Households may then depend on the realised incomes from their lands in the form of a start-up or working capital for other farming or non-farm activities. For rural economies in the developing world, land tends to have some influence in the credit market. Some households use their lands as collateral for loans from rural banks and other financial institutions and sometimes informal loans from money lenders and friends.

However, in the literature, the relationship between diversification and landholdings is found to be largely mixed. While there seems to be a positive effect of landholdings on income from agricultural employment, the relationship between landholdings and income from non-farm economic activity is found to be rather insignificant, negative or less important (Barret et al., 2000; Escobal, 2001; Senadza, 2010, 2012). Among other things, it has been argued that if rural households end up receiving a considerable share of their total income from agricultural employment, they may not have the incentive to diversify into a non-farm employment activity (Senadza, 2010). It could also be that these households tend to somewhat rely on rental income from their lands for consumption purpose. In this scenario, we are more likely to find the relationship between land and non-farm diversification to be less important among such rural dwellers. Another plausible explanation that has been cited in the literature is that the expected influence of landholdings on diversification may tend to disappear when other variables are accounted for in a regression analysis (Reardon et al., 2006).

Remittances

The inflow of remittances into the rural economy may play some role in explaining rural diversification. Generally, rural households may rely on remittance for their consumption and or investment purposes. On the basis that access to credit continues to be among the top-most challenges facing businesses in the developing world (Escobal, 2001; GSS, 2008, 2014; Honorati & de Silva, 2016), households that receive remittances may be less vulnerable relative to their counterparts without such opportunity. Among others, the inflow of remittance in the rural areas could motivate a greater expansion in agricultural activities and or empower rural households to diversify into the non-farm sector. Nonetheless, the findings from Senadza (2010, 2012) do not support such claim of positive effect of remittances on non-farm participation. Rather, the author found the relationship to be negative and argued that the recipients of these remittances might have invested them into their farming activities or possibly for consumption purposes.

Seasonality

In the rural environment, the issue of seasonality plays a key role towards a clearer understanding of diversification among workers and their households. In many developing countries, seasonality is primarily agricultural and rural phenomenon (Alderman and Sahn, 1989; Sahn, 1989; Barret et al, 2001; Ellis, 2000). Usually, when the main crop season is over, rural households tend to find some temporal economic activities for their survival. During this temporal period, these households can only receive minimal returns to their main agricultural activities. Therefore, as predicted by the farm household model, some rural households are most likely to shift their energy and resources to more rewarding economic activities, particularly in the non-farm sector (Alderman & Sahn, 1989; Ellis, 2000). Also, the existence of excess labour

during the period could force the migration of some rural dwellers to other agricultural communities, nearby towns and cities to look for temporal jobs. Once the main crop season begins, these migrant households are likely to return to their own villages and communities to be part of the major or new planting season.

Infrastructure

Previous studies have recognised the importance of infrastructural development in the diversification process (Barret et al., 2001; Escobal, 2001; Smith et al., 2001; Abdulai & CroleRees, 2001; Senadza, 2010, 2012). Infrastructures such as road, electricity, marketplaces/centres and financial institutions generally improve the employment opportunities in an economy. Thus, in the rural economy, the provision of infrastructures remains very key if governments or nations seek to promote diversification in the industrial activities like manufacturing and food processing and services such as wholesale, retail and educational services. Such development lowers business risks and uncertainties and increases the confidence or desire for diversification. The creation of these infrastructures can result in both direct and indirect employment opportunities. For instance, while road construction may provide direct employment to masons and other labourers, it may also generate some retail activities along the road to meet the need or demands of construction workers and some users of the road. Such road construction can also motivate agricultural activities due to, among others, the easy means of transporting farm produce to urban centres. In the same vein, financial institutions play a major role in the diversification process. Easy access to credit lowers the binding financial constraints that face a number of businesses, particularly in the developing countries where there seems to be much inefficiencies and low confidence in the financial sector (Honorati & de Silva, 2016;

Ackah et al., 2017). Comparatively, rural households that have easy access to finance in their communities or nearby towns can experience more diversified economic activities than those that lack such incentives.

Nevertheless, the empirical evidence on the exact relationship between rural infrastructural development and diversification seems debatable. While this infrastructural development may encourage more non-farm economic activities, it may, however, discourage diversification in the agricultural sector if rural households view the non-farm sector to be associated with higher returns or profits than the traditional sector (Low, 1986; Berry, 1989). In contrast, such infrastructural development can rather re-enforce a further diversification in the agricultural sector due to its strong linkage with the non-farm sector; these sectors are largely inseparable than been independent (Carter, 1997; Ackah, 2013; Osarfo et al., 2016). Escobal (2001) has argued that while infrastructural development may improve the returns in both the agricultural and non-farm sectors, the benefits are found to be greater for the latter than the former.

Other factors/determinants of diversification

Apart from the above mentioned determinants of diversification, other micro level factors including household size, dependency ratio, age, ethnicity and risk behaviours of households do influence the diversification process and decisions among households (Barret et al., 2001; Smith et al., 2001; Escobal, 2001; Senadza, 2010, 2012; Ackah, 2013). For instance, while large family size and dependency ratio could generally push many households to be in the labour market, those with a greater number of economically active members can easily diversify into different employment activities. Also, risk and uncertainty can easily affect the type of diversification that

a typical household may opt for, given that the risk averse ones are expected to behave different from those that are risk loving.

Based on the study's objective, the literature review has been presented and discussed largely from a *micro perspective*. Nevertheless, in some cases, the micro and macro factors of diversification are somehow intertwined. At the macro level, variables such as unemployment, inflation, economic growth, government policies and political instability may tend to influence the pattern and degree of diversification that may take place at some point in time in the economy. A country with peaceful governance and favourable government policies can boost the needed pull factors towards the generation of better employment opportunities among its citizens while a country with unfavourable macro environment may discourage certain types of investment and opportunities. All things being equal, any government policy, for instance, that focuses much on rural agricultural development may directly end up changing the level and degree of diversification within the agricultural sector and indirectly influence diversification in other areas of economic activities such as manufacturing and trading which rely more on raw materials and produce from the agricultural sector. Mostly, the condition of infrastructural development in an economy depends largely on the policies of the government, particularly from a developing country perspective. To some extent, we can implicitly or indirectly examine the influence of some of these macro factors on rural diversification through infrastructural indicators discussed above.

3.3.2.2 Evidence on welfare implications of diversification

Some prior studies have also considered the welfare implications of diversification. The research findings in this direction are also mixed (see for instance, Berry, 1989; Reardon et al., 1992; Carter, 1997; Ravallion & Datt, 2002; Dercon, 2002; Ersado, 2006; Scharf & Rahut, 2014; Akaakohol & Aye, 2014; Osarfo et al., 2016). One strand in the literature has argued that diversification harms the capacity and productivity of the agricultural sector since it diverts attention and limited resources like credit, quality time, farm profits and working capital to other economic activities that are mostly non-farm (Lipton, 1977; 1980; Low, 1986; Berry, 1989). This claim has been disputed by other researchers including Lucas and Stark (1985), Carter (1997), Ackah (2013) and Osarfo et al. (2016) who have rather postulated of a positive linkage between diversification and agricultural productivity. For instance, income or profit from the non-farm sector can serve as an alternative capital source to farmers and consequently reduce the burden of the long history of poor credit among farming communities (Senadza, 2010, 2011; Ackah, 2013). In a similar vein, engagement in non-farm work improves households' food security rather than harming the productive capacity of the agricultural sector (Babatunde & Qaim, 2010; Osarfo et al., 2016).

Relatedly, others have also examined the relationship between diversification and poverty. The overall result from this strand in the literature is that diversification into non-farm income generating activities is a poverty-reducing strategy (Reardon et al., 1992; Ravallion & Datt, 2002; Ersado, 2006). However, governments are advised not to prioritise the non-farm sector at the expense of agricultural activities. As argued by other schools of thought (Lipton, 1977; 1980; Low, 1986; Berry, 1989), such attempt can result to lower agricultural productivity and consequently food insecurity.

Another group of researchers have also sought to investigate the linkage between inequality and diversification (Reardon et al., 2000; Canagarajah et al., 2001; de Janvry & Sadoulet, 2001; Kung & Lee, 2001; Zhu & Luo, 2006; Senadza, 2011). The findings from these studies are mixed or contradictory. As already argued in chapter one (under the justification of the study), these contradictory results are due largely to the varied definitions or measures of diversification used in the literature (see a similar argument by Senadza, 2011; Scharf & Rahut, 2014). For instance, Scharf and Rahut (2014) found that high skilled non-farm activities increase inequality as compared to low skilled activities which decrease it. Senadza (2011) claimed that while income from the farm, as well as non-farm self-employment decreases inequality that of non-farm wage employment was found to be inequality-increasing. In contrast, authors including Adams (2001), Canagarajah et al. (2001) and Zhu and Luo (2006) found the inequality effect of income from wage employment and non-farm self-employment to be respectively negative and positive. A clear understanding of factors that underpin the income distribution process of nations remain a priority among governments, stakeholders and international bodies.

3.4 Chapter summary

This chapter reviewed the literature on different but related issues of employment and welfare. The review covered different concepts and theories that underpin occupational choice and diversification among individuals and their households. The empirical literature on the determinants of welfare and in particular, rural-urban inequality gaps was clearly established. Different groups of employment status were found to exert different effect on household welfare. The literature on the determinants of diversification pointed to mixed findings. For instance, factors such as education, gender, remittances and infrastructure seem not to have a clear directional effect on rural diversification. Additionally, the literature pointed to mixed findings on the relationship between non-farm diversification and rural inequality. Among other things, these contradictions were largely due to differences in the measures of diversification, datasets and estimation techniques used or employed by different authors.

CHAPTER FOUR

RURAL AND URBAN HOUSEHOLD CONSUMPTION WELFARE: THE ROLE OF EMPLOYMENT STATUS

4.0 Introduction

As already stated in the introductory chapter, the specific objective of this chapter is to examine the role of employment status in explaining rural and urban household consumption welfare. The associated research question is: To what extent do different groups of employment status explain the consumption distributions of rural and urban households? This research question seeks to understand how varied groups of employment status such as agricultural and non-farm employers and own-account, as well as formal and informal employees contribute differently to the welfare of households along the various quantiles of the consumption distribution. With this break down, the study can provide a better understanding of the differences in the returns to different groups of employment status in Ghana. Relatedly, the study also provides some plausible answers to the contributions of employment in explaining any observable consumption inequality gap between rural and urban household.

From the review of related literature in chapter three, it was established that employment and other factors including education, age, marital status, remittances, household size and location played important roles in explaining welfare (Nguyen et al., 2007; Tamvada, 2010; Go et al., 2007; Thu Le & Booth, 2014). Evidence on the welfare effects of different groups of employment status was found to be very scarce (Tamvada, 2010). Further, the literature review

on sources and determinants of rural-urban inequality gaps pointed to mixed findings (Nguyen et al., 2007; Go et al., 2007; Thu Le & Booth, 2014; Agyire-Tettey et al., 2018). This chapter, therefore, contributes to the literature by relying on different groups of employment status, consumption approach to welfare and improved estimation techniques to analyse the above specific objective and related research question.

The rest of the chapter is organised in the following sub-sections. The first and second sub-sections respectively present the study's methodology and brief descriptive statistics while the third sub-section focuses on discussing the results from various estimation techniques. The last sub-section summarises the findings of the chapter with a brief policy recommendation.

4.1 Methodology

4.1.1 The consumption model

This study employs a consumption approach to analyse Ghana's rural and urban household welfare. The choice of consumption over income (both being objective measures) is largely informed by the argument in the literature that consumption offers a relatively better proxy for measuring welfare in a developing country context like Ghana (Duclos & Araar 2006; Chang 2012; GSS, 2008, 2014; Deshpande & Sharma, 2016). The chapter on literature review shows that consumption is less volatile whereas income suffers much from seasonal variations and under reporting (Duclos & Araar, 2006; Chang, 2012; Deshpande & Sharma, 2016). This statement is supported by previous evidence in the developing world (Tamvada, 2010; Nguyen et al., 2007; Agyire-Tettey et al., 2018). Following these prior studies, this study relies on per adult equivalent real consumption. This specific indicator of welfare has been used by the Ghana

Statistical Service in analysing trends in welfare-poverty and inequality-over the past decades (GSS, 2008, 2014). Simply, per adult equivalent real consumption for a typical household is derived by dividing that household's total real consumption by its adult equivalent scale (GSS, 2014). The adult equivalent scale accounts for the differences in consumption or calorie requirements among different age cohorts (like infants, school going age, and adults) and gender dimension of persons living in a typical household (GSS, 2014). This scale or measure is largely applied in the field of nutrition in Ghana (GSS, 2018) and does, for instance, assume a lower consumption requirement of babies or young children than adult members of a household. Thus, it is a household size weight which ensures that individuals in a study sample are given equal weight rather than the households themselves.

Among others, previous studies have highlighted the importance of employment in determining welfare (Hamilton, 2000; van Praag & Versloot, 2007; Nguyen et al., 2007; Tamvada, 2010; Thu Le & Booth, 2014). The study accounts for the differences in employment status by exploring the welfare implications of public and private formal employees, informal paid and unpaid employees, employers and own-account in the agricultural and non-farm sectors. It also accounts for the welfare effects of the unemployed and inactive. Such detailed classification of employment can rightly inform policy makers of the returns to specific groups of workers.

This study postulates a higher effect of employers, particularly those in the non-farm sector, on consumption welfare than any other groups of workers. This is informed by the occupational choice theory that employers are most productive than own-account and paid workers (Banerjee & Neuman, 1993; Dabla-Norris et al., 2008; Tamvada, 2010). If so, we should expect employers

to be contributing more to household welfare relative to their counterparts. Also, while this study postulates higher returns to own-account than informal employees, unemployed and inactive, it does not, however, hypothesise higher returns to own-account than formal employees. Though Banerjee and Neuman (1993) and Dabla-Norris et al. (2008) have claimed that the next productive workers (after employers) are own-account followed by paid and subsistence workers, this assertion is likely to be rejected in most developing nations like Ghana. In Africa and elsewhere, while we may expect higher productivity and skills among own-account than informal employees (including unpaid workers), we may rather find more productive and skilled paid workers in the public and private formal sectors (GSS, 2014; Honorati & de Silva, 2016; Ackah et al., 2017). Generally, own-account workers face significant financial problems and other constraints which limit their potentials for survival and growth (GSS, 2014; Honorati & de Silva, 2016; Ackah et al., 2017). At best, it can be postulated that the own-account and formal paid workers may exert higher returns among poorer and richer households, respectively.

Further, non-farm self-employment is predicted to exert higher returns to welfare than agricultural self-employment. Often, agricultural activities are very unstable and seasonal than non-farm activities (Canagarajah et al., 2001; GSS, 2008, 2014; Senadza, 2011; Ackah, 2013). This is supported by the argument that non-farm income offers a better alternative for smoothening consumption and poverty reduction (Reardon et al., 1992; Ravallion & Datt, 2002; Ersado, 2006; GSS, 2008, 2014; Ackah, 2013; Scharf & Rahut, 2014).

Apart from employment, this study accounts for other factors that might influence welfare. Following the literature (Nelson, 1988; Lanjouw & Ravallion, 1995; Hamilton, 2000; van Praag

& Versloot, 2007; Nguyen et al., 2007; Tamvada, 2010; Thu Le & Booth, 2014; Deshpande & Sharma, 2016; Agyire-Tettey et al., 2018), the study controls for: personal characteristics such as age, gender, marital status, ethnicity and education; household characteristics including household size, dependency ratio, incomes received from remittances and rents; and locational status of the household. The choice of these variables are also largely informed by the theoretical underpinnings of push and pull factors which were discussed under occupational choice and diversification theories in chapter 3.

Based on the above information, an empirical model for consumption (welfare) can be stated as:

$$Y_i = \alpha + \lambda X_i + \varepsilon_i \quad (4.1)$$

Where Y is the log of per adult equivalent real consumption of a typical household (in annual terms); X is a vector of explanatory/independent variables (thus, employment status and the controls which are defined above); λ is a vector of coefficients to be estimated; α is the intercept term; and ε is the error term.

4.1.2 Estimation techniques

For consistency and robustness of estimates, this chapter applies four estimation techniques: Ordinary Least Squares (OLS), unconditional quantile regression (UQR), Oaxaca-Blinder and unconditional quantile decompositions (denoted respectively by OBD and UQD). The OLS and UQR are applied to estimate the determinants of welfare for the full sample of households and separately for rural and urban households while the decomposition approaches (OBD and UQD) are used to estimate the sources of rural-urban consumption inequality gaps, as well as the contributions of factors to such gaps.

4.1.2.1 Ordinary Least Squares (OLS)

By defining β to be a vector of all parameters to be estimated and N as the number of observations, the OLS estimator is obtained from the following minimisation of the sum of squared residuals as:

$$\sum_{i=1}^{N}(Y_i - X_i\beta)^2 \quad \text{, where } i = 1, 2, 3, ..., N \tag{4.2}$$

And Y and X are the dependent and independent variables which are already defined.

4.1.2.2 Unconditional Quantile Regression (UQR)

Unlike OLS which provides estimates at the mean only, quantile regressions (QR) provide estimates along the entire distribution (Koenker & Bassett, 1978; Melly, 2005, 2006; Firpo et al., 2009; Goedhuys & Sleuwaegen, 2010). For instance, with QR, we can estimate the differential effects of employment status along the lower, middle and upper parts of the consumption distribution. QR is relatively robust in the presence of outliers than OLS (Koenker & Bassett, 1978; Koenker & Hallock, 2001; Melly, 2005, 2006; Lee & Lee, 2006; Firpo et al., 2009).

Prior studies have either relied on conditional quantile regression (CQR) by Koenker & Bassett (1978) or unconditional quantile regression (UQR) by Firpo et al. (2009). While CQR is largely applied by researchers, only few studies have taken advantage of the UQR (see Borah & Basu, 2013; Thu Le & Booth, 2014; Agyire-Tettey et al., 2018). The UQR is more recent and improved estimation technique compared to the CQR. The former offers a better intuitive interpretation and generalisation of findings than the latter (Firpo et al., 2009; Powell, 2011; Borah & Basu, 2013; Thu Le & Booth, 2014). For instance, while the estimates from the CQR are sensitive to

changes in the distribution of independent variables that of the UQR overcomes such limitation (Firpo et al., 2009; Powell, 2011; Borah & Basu, 2013). Hence, this study applies the UQR by Firpo et al. (2009).

The estimation procedure for UQR is presented as follows. Assume that the observed Y depends on a set of X's, so that Y and X will have a joint distribution of the form $F_{Y,X}(.,.):\mathbb{R}\times\chi\to[0,1]$, and $\chi\subset\mathbb{R}^k$ is the support of X. Following this, the unconditional (marginal) distribution function of Y is stated as:

$$F_Y(y)=\int F_{Y|X}(y\mid X=x).dF_X(x) \tag{4.3}$$

The UQR technique draws much inspirations from two main concepts, namely, influence function (*IF*) and re-centered influence function (*RIF*). Assume $v(F)$ to be a distributional statistic at any quantile of the distribution, where $v:F_v\to\mathbb{R}$; and F_v as a class of distribution functions such that $F_Y\in F_v$ if $|v(F)|<+\infty$. According to Firpo et al. (2009), an influence function, denoted by $IF(Y;v(F))$, can be specified as the effect of a particular observation on $v(F)$ so that at the

τ^{th} quantile, the IF is defined as:

$$IF(Y;q_\tau,v(F))=(\tau-1\{Y\le q_\tau\})/f_Y(q_\tau) \tag{4.4}$$

Where q_τ is the sample quantile; $f_Y(q_\tau)$ is a density function at that sample quantile; and $1\{Y\le q_\tau\}$ is a dummy that shows whether the value of the outcome variable is below q_τ. The second concept, RIF, is then obtain by just adding the distributional statistic, $v(F)$, to the IF so that:

$$RIF(Y;v(F)) = v(F) + IF(Y;v(F)) \quad (4.5)$$

It must be indicated that the expected value of the RIF is just equal to the $v(F)$ since the expected value of the IF is zero (0). Assume that the statistics of interest is defined at the τ^{th} quantile so that $q_\tau = v(F)$, then the RIF (which is the new outcome variable) can be defined in terms of the statistics and the influence function as follows:

$$RIF(Y;q_\tau, v(F)) = q_\tau + (\tau - 1\{Y \le q_\tau\}) / f_Y(q_\tau) \quad (4.6)$$

It is said that the density function, $f_Y(q_\tau)$, in the above expression tends to bias (or underestimate) the standard errors. Therefore, in order to arrive at more robust standard errors, the literature recommends the application of bootstrapping during the estimation process (see Firpo et al., 2009).

At a given set of explanatory variables (X), the distributional statistics, q_τ, can be derived as:

$$q_\tau = E[RIF(Y;q_\tau, v(F)) \mid X] \quad (4.7)$$

Alternatively, based on the law of iteration,

$$q_\tau = \int E[RIF(Y;q_\tau, v(F)) \mid X] dF(X) \quad (4.8)$$

This implies that the conditional expectation of the RIF is basically a linear function of X such that:

$$E[RIF(Y;q_\tau, v(F)) \mid X] = X\beta + \varepsilon \quad (4.9)$$

Where the error term satisfies the zero conditional mean assumption. More importantly, this technique estimates the unconditional quantile partial effects (UQPE) of an explanatory variable

across the various quantiles of a distribution. Therefore, at the τ^{th} quantile, the UQPE, denoted by $\alpha(\tau)$, can be estimated below as:

$$\alpha(\tau) = E[dE[RIF(Y; q_\tau, v(F)) \mid X] / dx] \tag{4.10}$$

According to Firpo et al. (2009), either RIF-OLS, RIF-Logit or RIF-Nonparametric approach can be applied to estimate the above UQPE. Estimates from these three approaches are argued to be similar (Firpo et al., 2009). Therefore, based on the assumption of zero conditional mean of the error term in equation (4.9), the RIF-OLS approach can simply be applied. At the mean distribution, the OLS and UQR will yield a similar estimate. This study, therefore, applies the RIF-OLS for the estimation.

4.1.2.3 Oaxaca-Blinder Decomposition (OBD)

The decomposition method by Oaxaca (1973) and Blinder (1973) decomposes the difference in means between the outcome variables of two groups (in this case, the consumption variables for rural and urban households). The Oaxaca-Blinder decomposition (OBD) is based on the assumption of linearity and conditional independence between the explanatory variables, Xs, and the error term. With an additive property, the log of per adult equivalent real consumption (Y) for any two groups (g) is defined as:

$$Y_{gi} = \beta_{go} + \sum_{k=1}^{K} X_{ik}\beta_{gk} + v_{gi} \tag{4.11}$$

Where g denotes rural household (RH) or urban household (UH); K is the number of coefficients to be estimated. The OBD involves a two-stage approach. It first employs an OLS technique to estimate the mean effects of the explanatory variables for the rural and urban samples. The

second stage involves a computation of the mean differences in per adult equivalent real consumption between rural and urban households.

Therefore, the OBD can be derived as:

$$\hat{\Delta}_{OBD} = \overline{Y}_{UH} - \overline{Y}_{RH} \tag{4.12}$$

Alternatively,

$$\hat{\Delta}_{OBD} = [\sum_{k=1}^{K} (\overline{X}_{UHk} - \overline{X}_{RHk}) \hat{\beta}_{RHk}] + [(\hat{\beta}_{UH0} - \hat{\beta}_{RH0}) + \sum_{k=1}^{K} \overline{X}_{UHk} (\hat{\beta}_{UHk} - \hat{\beta}_{RHk})] \tag{4.13}$$

Where $\hat{\Delta}_{OBD}$ is the mean inequality gap between rural and urban households; $\overline{Y}$ and $\overline{X}$ are mean values; $\hat{\beta}_{RH}$ and $\hat{\beta}_{UH}$ are vectors of estimated parameters from OLS regression. The first component is termed as composition, covariate or explained effect while the second component is termed as structure, return or unexplained effect. Clearly, the explained effect accounts for differences in observable covariates or characteristics while the unexplained effect rather accounts for differences in estimated coefficients of (or returns to) observable characteristics between rural and urban households.

4.1.2.4 Unconditional Quantile Decomposition (UQD)

Following the argument in the literature on the limitations of OBD technique (see Oaxaca & Ransom, 1999; Barsky et al., 2002; Fortin et al., 2010, 2011), this study applies unconditional quantile decomposition (UQD) technique by Fortin et al. (2011). As already stated, in chapter 1, the OBD performs decomposition at the mean only and its estimates are argued to be sensitive to a categorical explanatory variable (Oaxaca & Ransom, 1999; Barsky et al., 2002; Fortin et al., 2011). Similar to the OBD, the UQD involves two stages. The first stage employs an UQR technique to estimate the parameters for rural and urban households while the second stage computes differences in per adult equivalent real consumption between rural and urban households at different quantiles.

Hence, at the τ th quantile, the UQD yields the following:

$$\triangle_Y^{\tau} = E[RIF(Y_{UH}; q_{UH,\tau})] - E[RIF(Y_{RH}; q_{RH,\tau})] \quad (4.14)$$

Alternatively,

$$\triangle_Y^{\tau} = \hat{\beta}_{UH\tau}(\overline{X}_{UH} - \overline{X}_{RH})] + [\overline{X}_{RH}(\hat{\beta}_{UH\tau} - \hat{\beta}_{RH\tau})] \quad (4.15)$$

Similarly to the OBD, the first and second components respectively represent the explained and unexplained effects at the τ th quantile.

Following the above, the contributions of independent variables (Xs) to the explained and unexplained components are respectively expressed as:

$$\hat{\beta}_{UH\tau}(\overline{X}_{UR} - \overline{X}_{RH}) = \sum_{k=1}^{K}[(\overline{X}_{URk} - \overline{X}_{RHk})]\hat{\beta}_{UHk,\tau} \quad \text{and;} \quad (4.16)$$

$$\overline{X}_{RH}(\hat{\beta}_{UH\tau} - \hat{\beta}_{RH\tau}) = \sum_{k=1}^{K}\overline{X}_{RHk}[(\hat{\beta}_{UHk,\tau} - \hat{\beta}_{RHk,\tau})] \quad (4.17)$$

Where K is the number of exogenous variables. Just like the case of UQR, Fortin et al. (2011) have indicated that the linearity of RIF (just discussed under UQR estimation procedure) makes it easier to simply apply the traditional OBD technique across various quantiles of a distribution. These quantile estimates from UQD are argued to be free from the problem of path dependence (Fortin et al., 2011).

4.1.3 Data source

The dataset for the analysis is obtained from the seventh round of the Ghana Living Standards Survey (GLSS7). This is a nationally representative household survey conducted by the Ghana Statistical Service (GSS) in 2016/17 with some assistance from other organisations including the World Bank. The survey collected detailed information on demographic characteristics of individuals, incomes, consumption expenditures of households, employment status of workers, among others. The GSS adopted a two-stage stratified random sampling procedure. The first stage involves a random selection of enumeration areas (EAs) which were first stratified according to the ten administrative regions of the country followed by rural and urban locations. In the second stage, a random maximum number of 15 households were selected from each of the EAs for an interview. Originally, 15,000 households were selected from 1,000 EAs for this exercise. Of this target, 14,009 households were successfully interviewed, representing 93.4% response rate. Of these numbers of households interviewed, rural and urban households constituted 7,991 and 6,018, respectively. For the purpose of this study, however, individuals within the working-age group of 15 years and older are considered. Coupled with missing data points for some variables, the study ended up with a slightly reduced sample size of 13,898 total households with rural and urban households accounting for 7,932 and 5,966, respectively. Table

4.1 presents the definitions of dependent and independent variables used for this empirical chapter.

Table 4.1 Definitions of dependent and independent variables (for chapter 4)

Dependent variable	
Log of Y	This is the log of per adult equivalent real household consumption (in annual values)
Variable of interest	
Shares of employment groups	These are the shares of household members in the following employment groups: public employees; private formal employees; informal paid employees; non-farm employers; non-farm own-account; agricultural employers; agricultural own-account; unpaid workers; unemployed and inactive
Controls:	
Family factors	
Shares of educational levels	Shares of household members with no, basic, secondary and tertiary educational levels
Female head	This is a dummy with a value of 1 for female head and 0 otherwise (thus, male)
Age of head	This is a continuous variable measuring head's age in years
Religion	This is categorical variable for head's religion: Christian, Muslim and other religion
Ethnicity	This is a dummy variable with a value of 1 if the household is headed by a person from the major ethnic group (Akan) and 0 otherwise
Marital status	This is a categorical variable for head's current marital status: married, divorced/widow and single
Remittance	This is a dummy with a value of 1 if the household receives remittances and 0 otherwise
Rental income	This is a dummy with a value of 1 if the household receives rental income (from land and farm equipment) and 0 otherwise
Dependency ratio	This is a continuous variable for household dependency ratio
Household size	This is a continuous variable for household size
Urban	This is a dummy with a value of 1 if the household is located in an urban area and 0 otherwise (thus, rural)

4.2 Selected descriptive statistics

Some descriptive statistics from the study's samples are presented below. Figure 4.1 compares the distribution of log of per adult equivalent real consumption for urban and rural households. The distribution for urban households is found to be at the right of the distribution for rural households, pointing to a generally higher consumption for the former relative to the latter. The urban economy reports a significantly higher mean value of per adult equivalent real consumption than their rural counterpart (Table 4.2a). The rural sample reports a relatively higher standard deviation of per adult equivalent real consumption than the urban sample, indicating a relatively higher level of inequality for the former than the latter. This observation confirms the Ghana Statistical Service report of the consistent higher and rise in rural inequality relative to the urban economy (GSS, 2018). Further, the descriptive statistics reveals significantly higher average values of dependency ratio and household size for rural than urban areas.

Table 4.2b presents the employment status of workers (household heads) for rural and urban households. On one hand, the data reports a significantly higher fraction of household heads engaged as agricultural employers and own-account than urban workers. On the other hand, a significantly higher proportion of urban than rural household heads is engaged as formal (public and private) and informal paid employees, agricultural employers and own-account. Unpaid workers and the inactive are relatively higher among urban than rural economies. The overall results point to a higher share for agricultural own-account (35.9%) followed respectively by non-agricultural (non-farm) own-account (20.8%) and private formal employees (11.8%). Agricultural employers followed respectively by unemployed and unpaid workers reported the least shares in the study's overall sample. Comparatively, these statistics imply a relatively lower

rate of unemployment among workers who are heads of households compared to unemployment rate for the entire population (including heads of households) (see for instance, Figure 2.5 in chapter 2).

Nearly a half of the sample reported no education (Table 4.2c). On average, urban areas report a significantly higher share of workers with higher education than those in rural areas. For instance, about 62.4% and 36.6% of rural and urban workers (heads of households) are without education respectively compared to around 4.6% and 16.7% of rural and urban workers having a tertiary educational qualification. These findings from the descriptive statistics fall in line with previous reports by the Ghana Statistical Service (GSS, 2008, 2014).

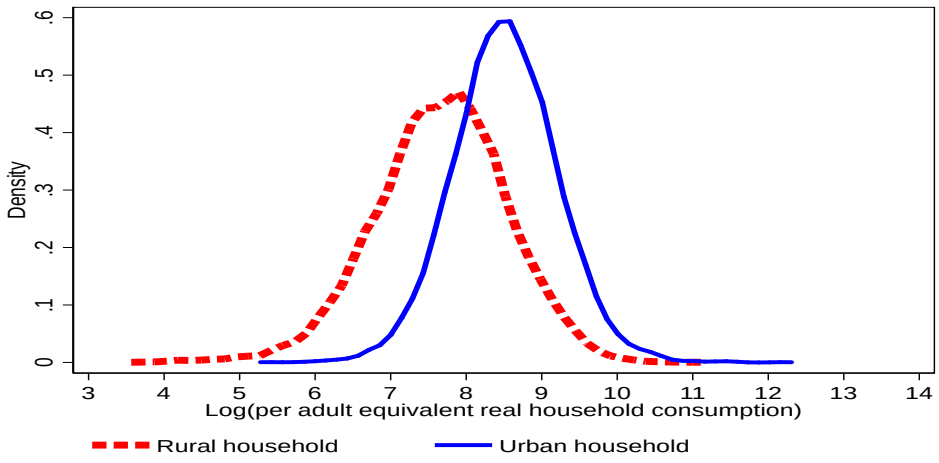


Figure 4.1 Plot of Kernel densities of log per adult equivalent real consumption for rural and urban households (using data from GLSS7)

Table 4.2a Means and standard deviations (Std. Dev.) of selected variables, by locality

	Urban		Rural			Overall	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Difference in mean**	**Mean**	**Std. Dev.**
Mean of per adult equivalent consumption (log)	8.51	0.69	7.66	0.88	0.85***	8.03	0.91
Dependency ratio	0.72	0.83	1.00	0.94	-0.29***	0.88	0.91
Household size	3.56	2.35	4.68	3.11	-1.13***	4.20	2.87

Source: Author's own computation from GLSS7; *** *p<0.01*, ** *p<0.05*, * *p<0.1*

Table 4.2b Employment status of household heads aged 15 years and above, by locality (%)

Employment status	Rural	Urban	Difference (Rural-urban)	Overall
Public employees	3.42	9.36	-5.94***	6.43
Private formal employees	6.18	17.31	-11.13***	11.81
Informal paid employees	4.51	8.63	-4.12***	6.60
Non-farm employers	1.58	6.22	-4.64***	3.93
Non-farm own-account	11.84	29.46	-17.62***	20.76
Agric. employers	1.63	0.64	0.99**	1.13
Agric. own-account	61.22	11.15	50.07***	35.89
Unpaid workers	1.82	2.20	-0.38***	2.02
Unemployed	0.61	2.25	-1.64***	1.44
Inactive	7.18	12.77	-5.59***	10.01
Total	100.00	100.00	---	100.00

Source: Author's own computation from GLSS7; *** *p<0.01*, ** *p<0.05*, * *p<0.1*

Table 4.2c Education level of household heads aged 15 years and above, by location (%)

Qualification	Rural	Urban	% Difference (Urban-Rural)	Overall
None	62.39	36.64	25.75***	49.36
Basic education	28.42	34.61	-6.19***	31.55
Secondary education	4.57	12.02	-7.45***	8.34
Tertiary education	4.62	16.73	-12.11***	10.75
Total	100.00	100.00	---	100.00

Source: Author's own computation from GLSS7; *** *p<0.01*, ** *p<0.05*, * *p<0.1*

4.3 Estimation results and Discussion

This sub-section presents the estimation results. Following the literature (Efron & Tibshirani, 1993; Andrews & Buchinsky, 2000; Cameron & Trivedi, 2005, 2009), the present study bootstrapped the standard errors in all estimations in order to obtain reliable and consistent estimates. Based on the argument by Cameron and Trivedi (2009), the bootstrapping was carried out with 400 replications. For simplicity, the estimates from UQR and UQD are reported for the 10^{th}, 25^{th}, 50^{th}, 75^{th} and 90^{th} quantiles of the distributions of per adult equivalent real consumption of households. The regression results from OLS and UQR are presented for the overall sample and separately for rural and urban households or samples. This is then followed by the decomposition results from OBD and UQD. Similar to Tamvada (2010), a robustness analysis shall be carried out to check for the consistency of the results.

4.3.1 Regression results from OLS and UQR

4.3.1.1 Results from the full sample: Estimates on urban and employment status variables

Table 4.3 displays a summary of the determinants of per adult equivalent real consumption from the full sample (see Table 4A1 in appendix for detailed estimates). First, the estimates of the effects of the urban locational variable provide further support for separate analysis for rural and urban households and for that matter the decomposition of inequality gaps between them. Thus, the estimates reveal significantly higher consumption welfare for urban households than their rural counterparts. This finding confirms the above descriptive statistics (see Figure 4.1 and Table 4.2a) and previous studies (Nguyen et al., 2007; Thu Le & Booth, 2014; Agyire-Tettey et al., 2018). All things being equal, the mean estimates from OLS indicate that being an urban household relative to being a rural household improves consumption welfare by 38.7%.

Estimates from the UQR clearly show a monotonically decreasing effect for the urban locational variable, particularly from the 25th quantile. That is, being an urban household relative to being rural household first increases welfare from 44.0% at the 10th quantile to 48.6% at the 25th quantile and thereafter by 46.9%, 32.7% and 21.8% at the 50th, 75th and 90th quantiles, respectively. These results imply a generally higher inequality among poorer households than richer ones. This pattern of rural-urban inequality gap is similar to previous evidence in Ghana (Agyire-Tettey et al., 2018) but contradicts the empirical findings in Vietnam (Nguyen et al., 2007; Thu Le & Booth, 2014).

The observed inequality gap between urban and rural households can be explained in diverse ways. Among others, urban economies are relatively developed with greater market opportunities and improved infrastructural development than rural economies (GSS, 2008, 2014). Thus, government tends to pay much attention in developing urban areas than the rural areas. Such developmental differences contribute to differential returns to similar economic activities in rural and urban areas (Agyire-Tettey et al., 2018). Comparatively, in many developing nations like Ghana, the rural economy is mostly dominated by agricultural activities while non-farm activities dominate that of urban. Therefore, differences in the productivity of agriculture and non-farm work can partly explain the welfare differences between rural and urban economies (Senadza, 2011; Ackah, 2013). Non-farm work offers higher and stable income sources than agricultural activities (Canagarajah et al., 2001; Zhu & Luo 2006; Senadza, 2011; Scharf & Rahut, 2014; GSS, 2014, 2016). Even within the rural economies, households that engage in non-farm activities tend to experience a greater welfare than those that depend largely on agricultural activities (GSS, 2008, 2014, 2018). Ghana's economic growth is recently

dominated by the non-farm sector (GSS, 2014, 2018). As revealed in chapter two (the overview), the services sector has overtaken the agricultural sector in terms of its contribution to Ghana's economic growth since 2006. Added to this, the oil and construction sub-sectors (which also fall within the non-farm sector) have stimulated the productivity of the industry sector, causing it to be the second contributor to economic growth since 2012 (GSS, 2014, 2018; ILO, 2018). The implication is that the present structural changes in the country tend to favour households that engage more in non-farm with the gains being stronger for urban than rural households (GSS, 2014).

The estimates of the effects of employment status variables on consumption welfare in Ghana are worth noting. As already stated in Table 4.1, the employment variables are measured or defined in terms of the shares of household members who are engaged in different groups of employment status, as well as those that are unemployed and inactive. The study sets the share of non-farm own-account as the reference group for employment. Holding all other factors constant, non-farm employers report the highest returns at the mean and along many quantiles. This finding is consistent with Tamvada (2010). Specifically, a 1% increase in the share of non-farm employers improves average household welfare by 30.8% relative to the share of non-farm own-account.

Table 4.3 Full sample estimates from OLS and UQR (using the employment status of all household members)

Variables	Mean	q10	q25	q50	q75	q90
Employment status (*reference group: share of non-farm own-account*)						
Share of public employees	-0.0152	-0.1440***	-0.1184***	-0.0857**	0.0206	0.2443**
	(0.0383)	(0.0460)	(0.0406)	(0.0436)	(0.0706)	(0.1120)
Share of private formal employees	-0.0546**	-0.2353***	-0.2209***	-0.1017***	0.0522	0.1472*
	(0.0272)	(0.0430)	(0.0358)	(0.0352)	(0.0534)	(0.0834)
Share of informal paid employees	-0.2744***	-0.3193***	-0.2648***	-0.2391***	-0.1824***	-0.2633***
	(0.0363)	(0.0632)	(0.0471)	(0.0474)	(0.0583)	(0.0780)
Share of non-farm employers	0.3075***	-0.0624	0.0346	0.2197***	0.5092***	0.7537***
	(0.0482)	(0.0573)	(0.0552)	(0.0627)	(0.0826)	(0.1403)
Share of agricultural employers	-0.0164	-0.1328	-0.0814	-0.2190*	-0.0724	0.2743
	(0.0980)	(0.2210)	(0.1444)	(0.1243)	(0.1364)	(0.2057)
Share of agricultural own-account	-0.3945***	-0.4626***	-0.5475***	-0.4476***	-0.3603***	-0.2831***
	(0.0239)	(0.0617)	(0.0442)	(0.0369)	(0.0397)	(0.0485)
Share of unpaid workers	-0.3191***	-0.5906***	-0.4677***	-0.3274***	-0.2429***	-0.1730***
	(0.0260)	(0.0733)	(0.0470)	(0.0362)	(0.0400)	(0.0545)
Share of unemployed	-0.3939***	-0.1911**	-0.2138***	-0.5167***	-0.5541***	-0.4633***
	(0.0513)	(0.0750)	(0.0692)	(0.0789)	(0.0928)	(0.1260)
Share of inactive	-0.3210***	-0.4681***	-0.3818***	-0.3328***	-0.2471***	-0.1577***
	(0.0263)	(0.0602)	(0.0414)	(0.0371)	(0.0430)	(0.0596)
Controls						
Urban location	0.3868***	0.4404***	0.4856***	0.4690***	0.3271***	0.2176***
	(0.0123)	(0.0315)	(0.0272)	(0.0227)	(0.0227)	(0.0274)
Other controls	YES	YES	YES	YES	YES	YES
Constant	8.0009***	6.6313***	7.3504***	8.2914***	8.7154***	9.2354***
	(0.0582)	(0.1602)	(0.0989)	(0.0830)	(0.0910)	(0.1109)
Observations	13,898	13,898	13,898	13,898	13,898	13,898
R-squared	0.5190	0.1766	0.3329	0.4024	0.3191	0.1853

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

On the other hand, estimates from UQR reveal the returns to non-farm employers in a household to be significantly monotonically increasing, particularly from the 50th quantile. Thus, relative to the share of non-farm own-account, a 1% increase in the share of non-farm employers significantly leads to 22.0%, 50.9% and 75.4% improvement in welfare at the 50th, 75th and 90th quantiles, respectively. Further, relative to the share of non-farm own-account, returns to the share of formal employment (public and private) are lesser at the mean, lower and middle quantiles but higher at the uppermost (90th) quantile. Also, at the mean and along the distribution, the study finds the returns to a higher share of informal wage earner, agricultural own-account, unpaid worker, unemployed and non-economically active (inactive) to be significantly lower than having a higher share of non-farm own-account. In the same line, the estimates point to insignificant differences in the returns to the shares of agricultural employers and non-farm own-account, apart from the 50th quantile where the latter reported a higher return to welfare than the former by about 21.9%.

To some extent, the findings seem to confirm the occupational choice theory that employers are the most productive workers followed by own-account with the least productive workers being employees (Baumol, 1990; Holmes & Schmitz, 1990; Gifford, 1993; Banerjee and Neuman, 1993; Lazear, 2005; Dabla-Norris et al., 2008). This assertion implies that employers and own-account are expected to contribute more to welfare than employees. Nevertheless, this claim seems to hold largely for non-farm self-employment than agricultural self-employment. Also, at the 90th quantile, the results rather point to higher returns to formal employment than non-farm own-account. The rest of the discussion from OLS and UQR now focuses on the separate analysis for rural and urban households. It should be pointed out that the results for the full

sample (thus, for Ghana as a whole) may not necessarily hold for the separate analysis for rural and urban households or samples.

4.3.1.2 Separate analysis for rural and urban households

Unlike the estimates from the full sample, the analysis for rural and urban households provides a much specific answers to the study's research question: To what extent do different groups of employment status explain the consumption distributions of rural and urban households? Tables 4.4 and 4.5 provide estimates for rural and urban samples, respectively (see the detailed estimates for rural sample in Table 4A2 and urban samples in Table 4A3 in the appendix). Similar to the full sample, the share of non-farm own-account is set as the reference group for employment status. The estimation results point to differential estimates of employment status variables along the distributions for urban and rural households. Also, to some extent, the results suggest differential contributions of employers and own-account to the consumption welfare of rural and urban households.

Holding all other factors constant, the mean estimates (from OLS) indicate that relative to the share of non-farm own-account, a 1% increase in the share of non-farm employers significantly increases consumption welfare by 25.6% for rural households and 34.2% for urban households. Relative to the share of non-farm own-account, the estimates reveal insignificant mean effects of formal employment (public and private) and agricultural employers on rural and urban households' welfare.

The estimates from UQR are much intriguing. Returns to non-farm self-employment are found to be highest across all quantiles for urban households and some quantiles for rural households. Among rural households, returns to the share of non-farm employers increase significantly by 25.6% and 59.8% respectively at the 50^{th} and 90^{th} quantiles relative to the share of non-farm own-account. For urban households, returns to the share of non-farm employers increase monotonically and significantly by 16.2%, 24.6%, 27.2%, 34.2% and 65.0% at the 10^{th}, 25^{th}, 50^{th}, 75^{th} and 90^{th} quantiles respectively. A higher share of public and private formal employees significantly decreases welfare at the lower quantiles but increases it at the upper quantiles for urban and rural households; returns to private formal employees are lower than own-account at the median (50^{th}) quantile. Similar to the full estimates, the findings imply that non-farm own-account benefits poorer rural and urban households than formal employment while the latter benefits their richer counterparts than the former.

Relative to the share of non-farm own-account, returns to a higher of agricultural employers are significantly lesser at the 25^{th} quantiles for rural households but significantly lower at the 10^{th} and 25^{th} quantiles and higher at the uppermost (90^{th}) quantile for urban households. The implication is that poorer rural and urban households benefit more from a higher share of non-farm own-account than agricultural employers while richer urban households seem to benefit more from the latter than the former. Compared to the share of non-farm own-account, higher shares of informal paid workers, agricultural own-account, unpaid workers, inactive and unemployed contribute to worsening rural welfare at the mean and along all quantiles for urban households and many quantiles for rural households.

Table 4.4 Rural sample estimates from OLS and UQR (using the employment status of all household members)

Variables	Mean	q10	q25	q50	q75	q90
Employment status (*reference group: share of non-farm own-account*)						
Share of public employees	-0.0031	-0.2076***	-0.2127***	-0.1180	-0.0233	0.4199*
	(0.0678)	(0.0671)	(0.0733)	(0.0798)	(0.1070)	(0.2348)
Share of private formal employees	-0.0717	-0.2601***	-0.2409***	-0.2117***	0.0269	0.3337**
	(0.0472)	(0.0703)	(0.0541)	(0.0643)	(0.0846)	(0.1515)
Share of informal paid employees	-0.3973***	-0.5928***	-0.4694***	-0.3880***	-0.2446***	0.0530
	(0.0609)	(0.1128)	(0.0790)	(0.0785)	(0.0878)	(0.1622)
Share of non-farm employers	0.2561***	0.0865	0.0755	0.2560**	0.1553	0.5979*
	(0.0989)	(0.0971)	(0.0955)	(0.1184)	(0.1700)	(0.3156)
Share of agricultural employers	-0.1445	-0.2329	-0.2523*	-0.0376	-0.2524	-0.0670
	(0.1278)	(0.2216)	(0.1492)	(0.1897)	(0.1924)	(0.2919)
Share of agricultural own-account	-0.3961***	-0.3212***	-0.4328***	-0.4673***	-0.4158***	-0.3618***
	(0.0316)	(0.0573)	(0.0478)	(0.0497)	(0.0542)	(0.0843)
Share of unpaid workers	-0.3828***	-0.4444***	-0.4393***	-0.4387***	-0.4178***	-0.3014***
	(0.0380)	(0.0829)	(0.0605)	(0.0548)	(0.0569)	(0.0884)
Share of unemployed	-0.2807***	-0.2191	-0.1351	-0.2299	-0.6357***	-0.3673
	(0.1077)	(0.1536)	(0.1348)	(0.1430)	(0.1808)	(0.2830)
Share of inactive	-0.4557***	-0.5703***	-0.5216***	-0.4837***	-0.3979***	-0.2404**
	(0.0421)	(0.0895)	(0.0609)	(0.0575)	(0.0622)	(0.0980)
Controls	YES	YES	YES	YES	YES	YES
Constant	8.0111***	6.8080***	7.4991***	8.0729***	8.7712***	8.8844***
	(0.0844)	(0.1631)	(0.1199)	(0.1108)	(0.1193)	(0.1742)
Observations	7,932	7,932	7,932	7,932	7,932	7,932
R-squared	0.4140	0.1104	0.2113	0.3113	0.2986	0.2125

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4.5 Urban sample estimates from OLS and UQR (using the employment status of all household members)

Variables	Mean	q10	q25	q50	q75	q90
Employment status (*reference group: share of non-farm own-account*)						
Share of public employees	-0.0040	-0.1358***	-0.1313***	-0.0664	0.1509**	0.2389**
	(0.0430)	(0.0479)	(0.0491)	(0.0482)	(0.0664)	(0.1122)
Share of private formal employees	-0.0277	-0.1140**	-0.1216***	-0.0869**	0.0202	0.1471*
	(0.0322)	(0.0457)	(0.0406)	(0.0404)	(0.0514)	(0.0809)
Share of informal paid employees	-0.1801***	-0.1437**	-0.1948***	-0.1748***	-0.2552***	-0.1813**
	(0.0365)	(0.0627)	(0.0547)	(0.0487)	(0.0559)	(0.0807)
Share of non-farm employers	0.3419***	0.1622***	0.2456***	0.2715***	0.3418***	0.6496***
	(0.0553)	(0.0603)	(0.0603)	(0.0606)	(0.0888)	(0.1565)
Share of agricultural employers	0.0633	-0.5603*	-0.3197*	-0.0666	0.1026	0.8777**
	(0.1602)	(0.2884)	(0.1879)	(0.1365)	(0.1976)	(0.3925)
Share of agricultural own-account	-0.5332***	-0.9006***	-0.6485***	-0.5186***	-0.4432***	-0.3063***
	(0.0450)	(0.1155)	(0.0745)	(0.0580)	(0.0583)	(0.0712)
Share of unpaid workers	-0.1889***	-0.2439***	-0.1770***	-0.1966***	-0.2432***	-0.2103***
	(0.0379)	(0.0760)	(0.0570)	(0.0480)	(0.0520)	(0.0715)
Share of unemployed	-0.3874***	-0.2797***	-0.4056***	-0.4469***	-0.4880***	-0.2889**
	(0.0527)	(0.1077)	(0.0816)	(0.0771)	(0.0830)	(0.1231)
Share of inactive	-0.1987***	-0.2228***	-0.2484***	-0.2259***	-0.1538***	-0.1860***
	(0.0336)	(0.0625)	(0.0484)	(0.0428)	(0.0479)	(0.0654)
Controls	YES	YES	YES	YES	YES	YES
Constant	8.5546***	7.3425***	8.3356***	8.6831***	9.1534***	9.3224***
	(0.0841)	(0.1793)	(0.1251)	(0.1101)	(0.1263)	(0.1765)
Observations	5,966	5,966	5,966	5,966	5,966	5,966
R-squared	0.3795	0.1567	0.2375	0.2661	0.2227	0.1380

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

4.3.2 Decomposition Analysis

This sub-section discusses the sources and determinants of consumption inequality gaps between urban and rural households, with a focus on the role of employment. The overall decompositions results are displayed in Table 4.6 while the contributions of factors to the two major components of inequality gaps are also shown in Table 4.7 (see Table 4A4 in appendix for detailed decomposition estimates). The decomposition results confirm the earlier findings of higher consumption welfare among urban households than their counterparts in the rural economy (see Table 4.3). The results from the UQD reveal that the consumption inequality gap between rural and urban household declines monotonically along the distribution, implying a higher inequality among poorer households than their richer counterparts. These findings are consistent with previous evidence in Ghana (Agyire-Tettey et al., 2018) and India (Deshpande & Sharma, 2016) but contradict those in Vietnam (Nguyen et al., 2007; Thu Le & Booth, 2014).

Along the quantiles, the study finds the gap due to the unexplained effect to be significantly higher than that of explained effect; the former accounts for over 90% of total consumption inequality gap at each quantile. On the other hand, the OBD seems to equally attribute the observed gap (at the mean) to explained and unexplained effects. However, on account that the UQD is argued to offer more reliable estimates than the OBD (Oaxaca & Ransom, 1999; Barsky et al., 2002; Fortin et al., 2010, 2011), it can be concluded that Ghana's rural-urban consumption inequality gap is largely due to the differences in the returns to or 'prices' of the characteristics between the two locations. These findings are in line with Ndoye (2015) and Agyire-Tettey et al. (2018) but contradict other evidences (Nguyen et al., 2007; Chirwa & Matita, 2009; Thu Le & Booth, 2014). As already argued, urban households tend to have a comparative advantage over

rural households in many aspects such as improved infrastructures, quality institutions and market systems-which consequently leads to differential returns to observable characteristics.

Further, the decomposition results point to the most important factors that contribute to the observed gap between rural and urban households (Table 4.7). Consistent with other findings (Nguyen et al., 2007; Thu Le & Booth, 2014; Agyire-Tettey et al., 2018), the study found employment, education and household size to be key in explaining rural-urban inequality gaps along the quantiles of the consumption distribution. These three factors explain much of the observed gap due to explained effect. In particular, across the quantiles, the contributions of employment status, education and household size to the explained effect are reported in the ranges of 34-44%, 27-34% and 22-30%, respectively. The effects of employment status are stronger at the lowest and upper quantiles while that of education are stronger and similar after the 10^{th} quantile. On the other hand, the effects of household size are quite stronger at the 25^{th} and 50^{th} quantiles. Hence, to minimise the explained effect of the observed rural-urban gap, attention should be geared towards improving the employment opportunities in rural areas. With regard to education, it is very obvious that urban households tend to have much higher educational qualifications than rural households (GSS, 2008, 2014). Promoting higher education among rural communities is very crucial towards minimising the observed inequality gap. Also, the part of the explained effect due to differences in household size remains obvious since rural households are characterised by a larger household size than those in urban areas (GSS, 2008, 2014). A plausible solution to this is effective family planning or birth control programmes among rural areas. Regarding the unexplained effect, however, the UQD results do not reveal any specific observable factor or variable that contributes most to the observed rural-urban gap along the quantiles.

Table 4.6 Overall decomposition of rural-urban consumption gap (using the employment status of all household members)

Variables	Mean	q10	q25	q50	q75	q90
Urban household	8.5149***	7.6536***	8.0675***	8.5111***	8.9645***	9.3872***
	(0.0091)	(0.0005)	(0.0007)	(0.0008)	(0.0006)	(0.0004)
Rural household	7.6614***	6.5592***	7.1143***	7.6922***	8.2548***	8.7504***
	(0.0097)	(0.0005)	(0.0006)	(0.0007)	(0.0006)	(0.0004)
Difference/gap	0.8535***	1.0944***	0.9532***	0.8188***	0.7097***	0.6368***
	(0.0132)	(0.0007)	(0.0009)	(0.0010)	(0.0008)	(0.0005)
Explained effect	0.4298***	0.0201***	0.0282***	0.0292***	0.0195***	0.0086***
	(0.0160)	(0.0011)	(0.0013)	(0.0012)	(0.0010)	(0.0006)
Unexplained effect	0.4238***	1.0743***	0.9250***	0.7896***	0.6902***	0.6282***
	(0.0182)	(0.0015)	(0.0015)	(0.0013)	(0.0010)	(0.0006)
% of gap unexplained	*49.65*	*98.16*	*97.04*	*96.43*	*97.25*	*98.65*
Observations	13,898	13,898	13,898	13,898	13,898	13,898

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4.7 Contribution of variables to rural-urban consumption gaps (using the employment status of all household members)

	Mean		q10		q25		q50		q75		q90	
Factor	**Exp.**	**Unexp.**	**Exp.**	**Unexp.**	**Exp.**	**Unexp.**	**Exp.**	**Unexp.**	**Exp.**	**Unexp.**	**Exp.**	**Unexp.**
Employment status	36.21	11.89	43.50	-0.38	35.36	0.01	34.47	0.20	38.78	0.43	38.37	0.05
Gender	1.23	3.85	-0.50	-0.03	0.36	0.00	1.02	0.20	3.06	0.28	3.49	0.08
Age	-0.81	16.61	0.50	1.50	-0.36	-0.18	-0.68	0.24	-2.04	0.03	-2.33	-0.59
Education	31.79	-6.68	27.50	0.08	30.36	0.05	33.45	-0.14	30.61	-0.22	32.56	-0.08
Religion	3.42	-9.41	5.50	-0.04	3.57	-0.30	2.39	-0.37	1.02	-0.17	2.33	0.00
Marital status	-2.26	-1.01	-3.00	-0.04	-3.57	-0.05	-0.68	-0.09	-0.51	0.07	-2.33	0.00
Ethnicity	2.40	-26.78	5.00	-0.17	3.21	-0.56	1.71	-1.10	0.00	-0.93	-1.16	-0.37
Dependency ratio	2.16	3.11	-1.00	0.23	1.79	0.02	2.05	-0.05	5.61	-0.25	4.65	0.00
Non-labour income	0.14	-13.38	-0.50	-0.20	0.00	-0.34	0.34	-0.39	0.51	-0.19	1.16	-0.13
Household size	25.72	-6.44	23.00	-1.13	29.29	-1.28	25.94	-0.98	22.96	0.39	23.26	0.48
Constant		128.24		100.17		102.62		102.47		100.55		100.56
Total	100	100	100	100	100	100	100	100	100	100	100	100

NB: Exp. and Unexp. for explained and unexplained components, respectively

4.3.3 Robustness checking: Using the employment status of household heads only

To check for the robustness and consistency of results, the study follows a similar approach by Tamvada (2010). The above estimations involved the employment status of all working-age household members. However, as agued in the literature (see Tamvada, 2010; Brunjes & Diez, 2013), such analysis may be potentially endogenous based on the assumption of interdependence among the employment variables. In Ghana and elsewhere, the issue of interdependence may be common among some members of a typical household. For instance, a wage employee in a particular household can provide assistance to an unemployed member to acquire a wage job or even assist him or her to become self-employed (Tamvada, 2010; Brunjes & Diez, 2013; GSS, 2014). Some plausible answers have been suggested to deal with this issue of endogeneity. For instance, the literature suggests that parents' employment (or occupation) could be used as an instrument for the employment variables of household members. However, the data points to the problem of missing values of parents' employment status for some household members which consequently and largely reduce the study's sample. Hence, following a similar approach by Tamvada (2010), the study addresses this anticipated problem (of endogeneity) by using just the employment status of household heads to carry out a second analysis for robustness checking. With this approach, the study can clearly examine the pure effect of workers' employment status on consumption welfare (Tamvada, 2010). For this second analysis or estimation, all variables remain as already defined, except for employment status and educational variables which are now defined in terms of categorical variables for household heads.

4.3.3.1 Regression Results from OLS and UQR

4.3.3.1.1 Results from the full sample: Estimates on urban and employment status variables

The full/overall sample estimates (in Table 4.8) are very similar to the earlier results (see Table 4.3 above), though with some expected marginal changes in terms of the magnitudes of some variables. The overall estimates provide a further support to the observed inequality gaps between rural and urban households (detailed estimates can be found in Table 4A5 in appendix). In particular, the results reveal significantly higher consumption rates for urban households than their rural counterparts at the mean and along all quantiles. The UQR similarly points to a monotonically increasing effect of urban locational variable along the different parts of the distribution, particularly from the 25th quantile. That is, all things being equal, being an urban household relative to being a rural household increases consumption welfare from 43.9% at the 10th quantile to 48.7% at the 25th quantile and thereafter by 48.2%, 36.0% and 25.2% at the 50th, 75th and 90th quantiles, respectively.

Also, the estimates of the effects of employment status from the full sample are, to some large extent, similar to the earlier findings (see Table 4.3). Relative to non-farm own-account, the estimates show that households headed by a non-farm employer are associated with higher consumption welfare at the mean and across the quantiles. This finding is in line with the evidence of Tamvada (2010). From the UQR, the returns to non-farm employer increases significantly and monotonically with rates of 10.0%, 23.9%, 33.4% and 46.8% respectively at the 25th, 50th, 75th and 90th quantiles relative to non-farm own-account. On the other hand, returns to private formal employees are lesser at the lower quantiles, though insignificant at the upper quantiles for both public and private formal employees. Similar to the earlier results, estimates

from the OLS and UQR show lower returns to informal paid worker, agricultural own-account, unpaid worker, unemployed and inactive relative to non-farm own-account. The returns to households headed by agricultural employer are not different from those headed by a non-farm own-account. Similar to the earlier discussion, the study now focuses on the separate results for rural and urban households.

Table 4.8 Full sample estimates of OLS and UQR (using the employment status of heads only)

Variables	Mean	q10	q25	q50	q75	q90
Employment status (*reference group: non-farm own-account*)						
Public employee	0.0059	0.0012	-0.0235	-0.0180	0.0113	0.0611
	(0.0306)	(0.0372)	(0.0322)	(0.0352)	(0.0488)	(0.0687)
Formal private employee	-0.0081	-0.0709**	-0.1077***	-0.0256	0.0269	0.0782
	(0.0222)	(0.0346)	(0.0289)	(0.0282)	(0.0388)	(0.0521)
Informal paid employee	-0.1691***	-0.2250***	-0.1880***	-0.1132***	-0.1216***	-0.1593***
	(0.0416)	(0.0520)	(0.0368)	(0.0365)	(0.0408)	(0.0508)
Non-farm employer	0.2557***	0.0434	0.1001***	0.2389***	0.3344***	0.4675***
	(0.0305)	(0.0445)	(0.0376)	(0.0426)	(0.0582)	(0.0888)
Agricultural employer	0.0606	0.0457	0.1031	-0.0207	-0.0184	0.1547
	(0.0699)	(0.1343)	(0.0918)	(0.0889)	(0.0804)	(0.1017)
Agricultural own-account	-0.2880***	-0.4165***	-0.4578***	-0.3170***	-0.2181***	-0.1097***
	(0.0237)	(0.0446)	(0.0336)	(0.0270)	(0.0265)	(0.0305)
Unpaid worker	-0.2341***	-0.4656***	-0.3379***	-0.1955***	-0.1997***	-0.1500**
	(0.0445)	(0.0914)	(0.0569)	(0.0468)	(0.0553)	(0.0692)
Unemployed	-0.2043***	-0.1793***	-0.1301**	-0.2059***	-0.2529***	-0.2120**
	(0.0505)	(0.0662)	(0.0557)	(0.0685)	(0.0841)	(0.1077)
Inactive	-0.2137***	-0.3011***	-0.2919***	-0.2208***	-0.1862***	-0.1005**
	(0.0262)	(0.0557)	(0.0379)	(0.0338)	(0.0338)	(0.0430)
Controls						
Urban location	0.4005***	0.4386***	0.4868***	0.4821***	0.3601***	0.2523***
	(0.0296)	(0.0317)	(0.0265)	(0.0224)	(0.0226)	(0.0276)
Other controls	YES	YES	YES	YES	YES	YES
Constant	7.8959***	6.3782***	7.1548***	8.1083***	8.8297***	9.2831***
	(0.0692)	(0.1476)	(0.0928)	(0.0775)	(0.0850)	(0.1005)
Observations	13,898	13,898	13,898	13,898	13,898	13,898
R-squared	0.5120	0.1744	0.3324	0.3973	0.3072	0.1732

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

4.3.3.1.2 Separate analysis for urban and rural households

Tables 4.9 and 4.10 provide the estimation results from OLS and UQR for rural and urban households, respectively (Tables 4A6 and 4A7 in appendix present detail estimates for rural and urban households, respectively). Again, the results are found to be largely consistent with the earlier results (see Tables 4.4 and 4.5 above). For instance, relative to non-farm own-account, the results show that households headed by non-farm employers receive a higher improvement in consumption welfare at the mean (from the OLS). Similar to the earlier results, the UQR estimates show significantly higher returns to non-farm employer than non-farm own-account along some quantiles for rural households and all quantiles for urban households. Similar to the previous findings, the analysis for rural and urban areas shows that households headed by informal paid worker, agricultural own-account, unpaid worker, unemployed and inactive report lower returns relative to those headed by a non-farm own-account. Relative to non-farm own-account, urban households that are headed by formal employees reported a significantly higher returns at the upper quantiles while rural households headed by formal private employees reported a significant lower returns at the 25^{th} and 50^{th} quantiles.

Table 4.9 Rural estimation results from OLS and UQR (using the employment status of heads only)

Variables	Mean	q10	q25	q50	q75	q90
Employment status (*reference group: non-farm own-account*)						
Public employee	0.0041	-0.0368	-0.0789	-0.0045	-0.0236	0.1543
	(0.0502)	(0.0654)	(0.0598)	(0.0649)	(0.0753)	(0.1457)
Formal private employee	-0.0317	-0.0655	-0.1108**	-0.1152**	0.0452	0.1093
	(0.0450)	(0.0517)	(0.0451)	(0.0536)	(0.0628)	(0.1024)
Informal paid employee	-0.2637***	-0.4117***	-0.3215***	-0.2309***	-0.1123*	-0.0011
	(0.0785)	(0.0868)	(0.0642)	(0.0590)	(0.0635)	(0.1112)
Non-farm employer	0.2157***	0.1174**	0.0594	0.2587***	0.1545	0.4061**
	(0.0634)	(0.0532)	(0.0698)	(0.0911)	(0.1053)	(0.1910)
Agricultural employer	0.0194	-0.0067	-0.0413	0.1242	0.0069	-0.0978
	(0.0897)	(0.1315)	(0.0979)	(0.1102)	(0.1266)	(0.1604)
Agricultural own-account	-0.2844***	-0.2399***	-0.3110***	-0.3299***	-0.2731***	-0.2804***
	(0.0316)	(0.0426)	(0.0370)	(0.0402)	(0.0399)	(0.0602)
Unpaid worker	-0.2931***	-0.3860***	-0.4379***	-0.2785***	-0.1660**	-0.2554**
	(0.0719)	(0.1147)	(0.0808)	(0.0655)	(0.0698)	(0.1151)
Unemployed	-0.2462**	-0.2922*	-0.2080	-0.0899	-0.4664***	-0.2299
	(0.1076)	(0.1763)	(0.1294)	(0.1446)	(0.1633)	(0.2515)
Inactive	-0.3029***	-0.2932***	-0.3564***	-0.3379***	-0.2684***	-0.2689***
	(0.0467)	(0.0701)	(0.0549)	(0.0528)	(0.0527)	(0.0743)
Controls	YES	YES	YES	YES	YES	YES
Constant	7.9018***	6.5992***	7.2898***	7.9531***	8.6628***	9.1302***
	(0.0867)	(0.1567)	(0.1123)	(0.1037)	(0.1140)	(0.1621)
Observations	7,932	7,932	7,932	7,932	7,932	7,932
R-squared	0.4043	0.1058	0.2054	0.3068	0.2890	0.1986

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4.10 Urban sample estimation results from OLS and UQR (using the employment status of head only)

Variables	Mean	q10	q25	q50	q75	q90
Employment status (*reference group: non-farm own-account*)						
Public employee	0.0074	-0.0488	-0.0443	-0.0147	0.0867*	0.1058
	(0.0343)	(0.0423)	(0.0388)	(0.0360)	(0.0447)	(0.0666)
Formal private employee	0.0112	-0.0266	-0.0256	-0.0349	0.0413	0.1069**
	(0.0250)	(0.0389)	(0.0327)	(0.0321)	(0.0376)	(0.0534)
Informal paid employee	-0.0958***	-0.0993*	-0.0818*	-0.0804**	-0.1284***	-0.0847*
	(0.0312)	(0.0588)	(0.0461)	(0.0375)	(0.0401)	(0.0498)
Non-farm employer	0.2696***	0.1731***	0.2359***	0.2254***	0.2865***	0.4367***
	(0.0364)	(0.0443)	(0.0454)	(0.0457)	(0.0569)	(0.0892)
Agricultural employer	0.0474	-0.2029	-0.0988	0.0197	0.0958	0.3711*
	(0.1017)	(0.2005)	(0.1442)	(0.0923)	(0.1162)	(0.2073)
Agricultural own-account	-0.3562***	-0.7211***	-0.4513***	-0.3292***	-0.1880***	-0.1022***
	(0.0377)	(0.0868)	(0.0486)	(0.0344)	(0.0339)	(0.0357)
Unpaid worker	-0.1591***	-0.2364***	-0.1493**	-0.1605***	-0.1772***	-0.1870**
	(0.0460)	(0.0883)	(0.0628)	(0.0553)	(0.0633)	(0.0772)
Unemployed	-0.1609***	-0.0841	-0.1020	-0.2047***	-0.2148***	-0.1009
	(0.0527)	(0.0851)	(0.0763)	(0.0681)	(0.0736)	(0.0960)
Inactive	-0.1471***	-0.1843***	-0.1846***	-0.1640***	-0.0818**	-0.1198**
	(0.0293)	(0.0575)	(0.0432)	(0.0367)	(0.0363)	(0.0470)
Controls	YES	YES	YES	YES	YES	YES
Constant	8.4847***	7.2851***	8.1817***	8.6635***	9.1246***	9.2519***
	(0.0920)	(0.1729)	(0.1138)	(0.1038)	(0.1190)	(0.1616)
Observations	5,966	5,966	5,966	5,966	5,966	5,966
R-squared	0.3680	0.1611	0.2330	0.2557	0.2100	0.1240

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

4.3.3.1.3 Decomposition results from OBD and UQD

The overall decomposition estimates from Table 4.11 are also similar to the earlier findings (see Tables 4.6). For instance, results from the UQD reveal a monotonically decreasing trend of rural-urban inequality gaps across the quantiles. Again, at all quantiles, the gap due to unexplained effect is found to be significantly higher than that of explained effect, accounting for over 90% of the rural-urban inequality gap. Table 4.12 displays the estimates on the most important factors that contribute to the observed gap between urban and rural households (detailed estimates are shown in Table 4A8 in appendix). The results confirm the earlier findings (in Table 4.7) that employment status, education and household size remain the three most important contributing factors to the explained rural-urban inequality gap. Particularly, across the quantiles, the contributions of employment status, education and household size to the explained gap reported to be in the ranges of 24-54%, 18-37% and 20-33%, respectively. Like the previous decomposition results, no specific observable factor is found to be an important contributor to the gap due to the unexplained effect.

Table 4.11 Overall decomposition of rural-urban consumption gap (using the employment status of heads only)

Variable	Mean	q10	q25	q50	q75	q90
Urban household	8.5149***	7.6536***	8.0675***	8.5111***	8.9645***	9.3872***
	(0.0211)	(0.0005)	(0.0007)	(0.0008)	(0.0006)	(0.0004)
Rural household	7.6614***	6.5592***	7.1143***	7.6922***	8.2548***	8.7504***
	(0.0302)	(0.0005)	(0.0007)	(0.0008)	(0.0006)	(0.0004)
Difference/gap	0.8535***	1.0944***	0.9532***	0.8188***	0.7097***	0.6368***
	(0.0372)	(0.0007)	(0.0010)	(0.0011)	(0.0009)	(0.0006)
Explained effect	0.4249***	0.0213***	0.0285***	0.0282***	0.0172***	0.0075***
	(0.0240)	(0.0013)	(0.0013)	(0.0012)	(0.0009)	(0.0006)
Unexplained effect	0.4287***	1.0732***	0.9247***	0.7907***	0.6925***	0.6293***
	(0.0361)	(0.0016)	(0.0016)	(0.0014)	(0.0010)	(0.0006)
% of gap unexplained	*55.23*	*98.06*	*97.01*	*96.57*	*97.58*	*98.82*
Observations	13,898	13,898	13,898	13,898	13,898	13,898

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4.12 Factor contribution to rural-urban consumption gaps (using the employment status of heads only)

Variable	Mean		q10		q25		q50		q75		Q90	
	Exp.	Unexp.	Exp.	Unexp	Exp.	Unexp.	Exp.	Unexp.	Exp.	Unexp.	Exp.	Unexp.
Employment status	40.17	-2.73	53.77	-0.89	42.86	-0.43	37.59	-0.15	30.06	0.48	24.32	0.43
Gender	1.53	3.01	-0.47	-0.05	0.36	0.00	1.42	0.19	3.47	0.26	4.05	0.08
Age	-1.08	20.27	0.47	1.36	-0.71	0.10	-1.06	0.37	-1.73	-0.10	-2.70	-0.46
Education	25.98	-4.18	18.40	0.07	23.21	0.05	27.30	-0.08	31.79	-0.09	36.49	-0.06
Religion	3.65	-7.30	5.19	-0.06	3.57	-0.28	2.84	-0.27	1.73	-0.09	2.70	0.08
Marital status	-1.77	0.40	-2.36	-0.01	-3.21	-0.21	-0.35	-0.40	0.00	-0.01	-1.35	1.02
Ethnicity	2.71	-27.08	5.19	-0.18	3.57	-0.57	2.13	-1.11	0.00	-0.95	-1.35	-0.38
Dependency ratio	2.47	5.13	0.00	0.18	2.50	0.02	2.48	0.01	5.20	-0.12	4.05	0.11
Non-labour income	0.00	-13.34	-0.47	-0.21	0.00	-0.35	0.35	-0.42	0.58	-0.20	1.35	-0.14
Household size	26.34	-10.15	20.28	-0.91	27.86	-1.16	27.30	-1.15	28.90	0.01	32.43	0.19
Constant		135.97		100.69		102.82		103.01		100.81		99.14
Total	100	100	100	100	100	100	100	100	100	100	100	100

NB: Exp. and Unexp. for explained and unexplained components, respectively.

4.4 Chapter summary

This chapter underscored the importance of accounting for different groups of employment status in the analysis of rural and urban household consumption welfare. The quantile analysis revealed a differential contribution of employment status along the entire distribution of household consumption, regardless of location. Overall, the study found higher returns to non-farm employers than other groups of workers; the effects were significant across all quantiles for urban households and some quantiles for rural households. Returns to non-farm own-account were found to be generally higher than agricultural own-account, regardless of location. Relative to non-farm own-account, formal employees contributed to lowering and increasing household consumption welfare at the lower and upper quantiles, respectively. Compared to non-farm own-account, the study found lower returns to informal paid employees, unpaid workers, inactive and the unemployed, regardless of location. Across all quantiles, the study showed higher consumption welfare among urban than rural households. The observed rural-urban inequality gaps were greater among lower/poorer households than upper/richer households. These gaps were mainly due to differences in returns to observable characteristics. Of all the observable factors used, employment status, education and household size contributed most to the explained rural-urban inequality gaps in Ghana.

These findings call for the improvement in the returns to agricultural self-employment and informal paid and unpaid employment. To minimise the observed rural-urban inequality gaps, policy makers should aim at improving the pull factors or employment opportunities in rural areas. Among others, government's proposed programmes on one-village-one-dam and one-district-one-factory should be beneficial to low-income households, particularly for those who

rely primarily on agricultural self-employment and informal sort of employment. Such opportunities could also address the deteriorating effects of unemployment and inactivity on household consumption welfare. Promoting higher education and family planning programmes across the rural areas cannot be ignored. The current policy on free senior high school should be of higher priority and motivation among rural households.

CHAPTER FIVE

THE EXTENT AND DETERMINANTS OF EMPLOYMENT DIVERSIFICATION IN RURAL GHANA

5.0 Introduction

As already stated in the introductory chapter, the specific objective for this chapter is to analyse the degree and determinants of employment diversification among households in rural Ghana. The related research question to be answered is: What are the degree and determinants of employment diversification within and across the three major sectors (agriculture, services and industry) in rural Ghana? This research question is in two-fold. The first part focuses just on the degree or the extent of households' employment diversification that is observed within each of and across the three sectors while the second part seeks to provide some insights on the key factors that may explain the degree of the observed employment diversification. To provide rich information on diversification, the study relies on nationally representative datasets by the Ghana Statistical Service for the years 2005/06 and 2016/17 (GLSS 5 and 7, respectively). Within this period, as revealed in chapters one and two, Ghana is said to experience major structural changes, for instance, in sectoral contributions to GDP and employment. The period under discussion also saw the implementation and end of the Millennium Development Goals (MDGs) where Ghana was praised of achieving the MDG 1 target of halving poverty ahead of time. Importantly, the comparability of the two datasets (GSS, 2018) makes it feasible to provide some understanding of the observed structural changes in the labour market, for instance, regarding the

increasing and decreasing shares of non-farm and agricultural employment respectively in rural Ghana (GSS, 2008, 2014). Relatedly, a good number of rural households in Ghana now receive a greater part of their income from non-farm employment over the period (Senadza, 2010, 2011; GSS, 2014, 2018). It is, therefore, imperative for this study to be carried out to provide a better insight on the degree of employment diversification and its determinants among rural workers and their households.

From the chapter on the literature review, it was observed that different studies have sought to understand the nature of diversification process among rural households in many developing nations. A key issue from these prior studies is the inconsistencies on the determinants of rural diversification (Barret et al. 2001; Escobal, 2001; de Janvry and Sadoulet, 2001; Reaedon et al., 2006). For instance, there is unclear effect of variables such as gender, education, landholdings and infrastructures on rural diversification. As presented in the literature review, these unresolved issues can be attributed largely to the applications of different measures of diversification and datasets used by different researchers in the literature (Barret et al. 2001; Senadza, 2010, 2011, 2012; Scharf & Rahut, 2014). This chapter, therefore, contributes to the present debate by applying an improved measure of diversification (using entropy index) and two nationally representative survey datasets for Ghana in the periods 2005/06 and 2016/2017.

5.1 Methodology

5.1.1 Entropy index: A measure of diversification

The literature documents a number of statistical measures for diversification and these include Ogive, Herfindahl, locational quotient, Hackman, and Shannon entropy indices (Hackbart & Anderson, 1978; Jacquemin & Berry, 1979; Attaran & Zwick, 1987, 1989; Gollop & Monahan, 1991; Mishra et al., 2004; Park & Jang, 2012; Pallares & Adkisson, 2017). The following presents some background to these indices with emphasis on the entropy index, its comparative advantage and derivation or estimation processes. The *Ogive index* measures the performance or contribution of an industry in a typical economy, often measured in terms of industry's employment share. It ranges between 0 and 1 with greater (or lower) values implying lower (or greater) diversification while values of exactly 1 and 0 reflect zero and perfect diversification, respectively. On the other hand, the *Herfindahl index* is a direct and indirect measure of concentration and diversification in an economy. It is an extensively used index particularly in the industrial literature, though applicable to other fields of studies. Similar to the Ogive index, it ranges between 0 and 1 with higher value directly implying greater concentration and hence, indirectly as lower diversification; similarly, this index is often defined in terms of industry's employment share.

In the same line, the *Location quotient* attempts to compare the share of employment for an industry/sector in a relatively small location or economy (e.g. regional level) to its corresponding share at the wider location or economy (e.g. national level). It is often termed as the coefficient of concentration such that a value greater (or smaller) than one implies that the industry's regional share in employment is greater (or smaller) than its corresponding share at the national level. The *Heckman Index* is generally derived as the reciprocal of the sum of location quotients

weighted by industry shares in employment within the small economy. Similarly, this index is bounded by 0 and 1 with values close to 0 implying different industrial structures at the small and wider economies or locations.

This study, however, applies the Shannon entropy index. Compared to other measures of diversification, the entropy index offers a unique property of decomposition and analytical benefits (Jacquemin & Berry, 1979; Attaran & Zwick, 1987, 1989; Hitt et al., 1997; Park & Jang, 2012). In other words, the entropy index can decompose total diversification into within and across components; the former can also be sub-divided into different groups. In relation to the study's objective, this index can allow us to identify the extent or degree of employment diversification within and across the three major sectors, namely, agriculture, industry and services. Though this index was originally developed from an information theory perspective, it has, however, been applied in different fields of study such as biology, physics, business and economics (Carter, 1977; Jacquemin & Berry, 1979; Mishra et al., 2004; Park & Jang, 2012).

The following presents the derivation of the entropy index of diversification. Define P_i to be employment share of i^{th} economic activity in total employment and n as the total number of economic activities engaged by workers in a typical economy. Following the literature (Jacquemin & Berry, 1979; Attaran & Zwick, 1987, 1989; Mishra et al., 2004; Park & Jang, 2012), the general Shannon entropy index of diversification, denoted by E, can be written as follows:

$$E = \sum_{i=1}^{n} P_i \log_2\left(\frac{1}{P_i}\right) = -\sum_{i=1}^{n} P_i \log_2(P_i) \qquad (5.1)$$

Equation (5.1) shows that each economic activity is weighted by the logarithm of its own share in total employment.

The following can be deduced from the above entropy index: First, if one (1) economic activity employs all workers in the economy, then just one of the $P_i = 1$, with the rest being 0. With this, the entropy index will take the lowest value of zero (0), indicating no diversification. This can further be termed as the total concentration of employment in just one economic activity of the economy. Second, if P_i is however reported to be the same for each of the n economic activities, then the entropy index will take a maximum value of $\log_2(n)$. This is an extreme case where the economy is said to have reached its total diversification stage. In this case, there is zero or no concentration of employment in the economy. Third, the range of values for the entropy index can then be specified as $0 \leq E \leq \log_2(n)$. Fourth, the index increases as the number of economic activities (n) also increases, implying that the entropy index performs much better with a large sample size (Jacquemin & Berry, 1979; Mishra et al., 2004).

As already indicated, this study seeks to analyse employment diversification within and across the three major sectors of an economy, namely, agriculture, industry and services. To do this, suppose there are "n" economic activities at a 4-digit International Standard Industrial Classification (ISIC) levels. Assume also that these 4-digit ISIC levels are further aggregated into "g" groups (in this case, agriculture, industry and services sectors) such that $n > g$. Following these, the employment share of each g group is defined to be:

$$P_g = \sum_{i \in g} P_i \tag{5.2}$$

So that the entropy index for *within* diversification (of each of the g groups), denoted by E_w, can be defined below as:

$$E_w = \sum_{i \in g} \frac{P_i}{P_g} \log_2 \left(\frac{P_g}{P_i} \right) \tag{5.3}$$

Borrowing from equation (5.1), the entropy index for *across* diversification (thus, between or across the g groups), denoted by E_A, can also be expressed as:

$$E_A = \sum_{g=1}^{g} P_g \log_2 \left(\frac{1}{P_g} \right) = -\sum_{g=1}^{g} P_g \log_2 (P_g) \tag{5.4}$$

To clearly understand the relative importance of each g group to the within component of diversification, the literature suggests that the within entropy index should be weighted by the relative share of each g group (see Jacquemin & Berry, 1979; Attaran & Zwick, 1987, 1989; Park & Jang, 2012). Therefore, by weighting equation (5.3) by P_g, we arrive at:

$$E_w = \sum_{i \in g} P_g \left\{ \frac{P_i}{P_g} \log_2 \left(\frac{P_g}{P_i} \right) \right\} \tag{5.5}$$

Hence, the entropy index of total diversification can be derived by adding equations (5.4) and (5.5) to obtain the expression below:

$$E_T = \sum_{g=1}^{g} P_g \left(\sum_{i \in g} \frac{P_i}{P_g} \log_2 \left(\frac{P_g}{P_i} \right) \right) + \sum_{g=1}^{g} P_g \log_2 \left(\frac{1}{P_g} \right) \tag{5.6}$$

Alternatively, equation (5.6) can be re-specified as:

$$E_T = \sum_{g=1}^{g} P_g (E_w) + E_A \tag{5.7}$$

Very markedly, the first component of equation (5.7) measures within diversification that is weighted by the relative share of each g group in total employment while the second component measures diversification across or between the g groups. In order words, the within diversification captures the degree of diversification within each of the g groups. Given that this chapter focuses on the three major sectors (thus, g=3), the within diversification component can be split into diversification within each of the three sectors so that the total index for employment diversification in equation (5.7) above can be simplified in the following expression:

$$E_{Total} = E_{within\_agric} + E_{within\_services} + E_{within\_industry} + E_{across\_sectors} \quad (5.8)$$

Where the first, second and third terms represent employment diversification within the agricultural, services and industry sectors, respectively; the last term also captures diversification across these three sectors.

5.1.2 Empirical model: Determinants of employment diversification

Following previous empirical studies, the study specifies an empirical model for the determinants of employment diversification in the equation below:

$$EntropyIndex_{ij} = \alpha + \lambda X_i + \varepsilon_i \quad (5.9)$$

Where $EntropyIndex_{ij}$ is the outcome variable for employment diversification which is obtained from the entropy index discussed above; i denotes a typical rural household and j denotes a type (or component) of diversification. Following from equation (5.8), this chapter shall consider five (5) types or components of employment diversification. Put differently, the study shall estimate the determinants of employment diversification within agriculture (E_{within_agric}), services

($E_{within\_services}$), industry ($E_{within\_industry}$), across the three sectors ($E_{across\_sectors}$) and lastly, for total diversification (E_{Total}). While findings from the latter (thus, total diversification) can only tell of the general determinants of employment diversification, the other four components can rightly inform policy makers of the specific factors that influence the degree of households' diversification within and across the three major sectors of the rural economy.

X_i is a vector of independent or explanatory variables. For the purpose of this chapter, the explanatory variables are classified into three main themes: (i) heads and households' factors/characteristics; (ii) community factors/characteristics; and (iii) geographical location/ecological zones. These independent variables are informed by both the theoretical and empirical literature (Barret et al., 2000, 2001; Escobal, 2001; de Janvry & Sadoulet, 2001; Reaedon et al., 2006; Senadza, 2010, 2012). Following from the literature review section on the determinants of diversification in chapter three, the first classification-head's and household characteristics-shall include the following variables: gender, age, marital status, religion, ethnicity, education, dependency ratio, household size, whether household receives remittance or not and landholdings. The community characteristics shall include the following: seasonal migration and infrastructural indicators including distance to market and financial institutions (like banks and micro-finance), access to passable road, electricity and portable water source. Finally, differences in locational status may also influence the diversification strategies of households. Findings from prior studies on rural Ghana provide much support to the inclusion of a geographical location as a potential determinant of rural diversification (Canagaraja et al., 2001; Senadza, 2012). Hence, this study accounts for the three main ecological zones in Ghana, namely, coastal, forest and savannah zones or belts.

The literature review (in chapter 3) pointed to mixed findings on the determinants of rural diversification. Among others, variables such as gender, education, landholdings, remittances and infrastructure seem to have unclear effect on rural diversification (Newman & Canagarajah, 2000; Canagarajah, 2001; Escobal, 2001; Reaedon et al., 2006; Senadza, 2010, 2012). A plausible reason to these mixed findings is the application of different measures of diversification used by these previous studies. Prior studies have primarily been concerned with the pattern of diversification without paying explicit attention to the extent or degree of such diversification process. In most of these studies, diversification has largely been limited to just the income from non-farm sources or participation in the non-farm sector. These measures fail to properly capture the degree of the on-going diversification process where some rural households seem to increase their diversification within a particular sector and sometimes across the sectors. Hence, this study adds to the literature by relying on the entropy index to clearly analyse the extent and determining factors of the on-going rural diversification within and across different sectors.

α and ε_i in equation (5.9) are defined to be the constant and error terms, respectively; and λ is a vector of coefficients (of the independent variables, $X's$) to be estimated.

5.1.3 Estimation technique: Heckman Two-Step Estimator (HTSE)

To estimate the determinants of employment diversification in equation (5.9) above, the study seeks to employ the Heckman Two-Step Estimator (Heckman, 1979), denoted hereafter as HTSE. This estimation technique is widely applied by researchers in different fields of studies,

particularly in the labour literature. The HTSE addresses the problem of selection bias which undermines the efficiency of the estimates from the traditional Ordinary Least Squares (OLS) regression (Cameron & Trivedi, 2005, 2009). For example, in this chapter, we can only observe the outcome of the degree of employment diversification for households that have at least one of their members engaged in some sort of employment activities in the agricultural, services and or industry sectors. By focusing only on those who are currently employed, we are however not using the full information on the entire rural population. This is problematic if, for instance, hardworking households end up being employed while their non-hardworking or discouraged counterparts stay out of the labour market. This implies that by simply applying the OLS, we will only end up estimating the determinants of diversification for the hardworking households, making it difficult to generalise the findings for the total population.

The HTSE involves a two-stage estimation process. The first stage estimates a selection or participatory equation (such as households' employment decision) while the second stage estimates an outcome or observation equation (like the degree of employment diversification by households).

Define the selection equation as:

$$s_i^* = z_i\pi + \mu_i \tag{5.10}$$

Such that:

$$s = \begin{cases} 1, s_i^* > 0 \\ 0, s_i^* \leq 0 \end{cases}$$

Where s_i^* is the latent variable for S; z_i is a vector of independent variables that influence the participation; π is a vector parameters; and μ_i is the error term. In line with this study, S is assigned a value of one (1) if a household has at least one member who is involved in some form of employment, for $s_i^* > 0$ and zero (0) otherwise, for $s_i^* \leq 0$.

On the other hand, the outcome equation, denoted by y, is defined as follows:

$$y_i = x_i\beta + \varepsilon_i, \quad \text{for the case where } s_i^* > 0 \text{ but missing for } s_i^* \leq 0 \tag{5.11}$$

From equations (5.10) and (5.11), a selection problem may emerge if we can find any correlation between the two error terms in both equations (thus, μ_i and ε_i). In such a situation, the two equations are no longer independent. Basically, the HTSE assumes a bivariate normal distribution with the following assumptions:

$$\mu_i \sim N(0,1),$$

$$\varepsilon_i \sim N(0,\sigma^2) \text{ and}$$

$$corr(\mu_i, \varepsilon_i) = \rho \tag{5.12}$$

Following this, the conditional mean for the outcome variable can be expressed in the following as:

$$E[y_i \mid s^* > 0] = E[x_i\beta + \varepsilon_i \mid z_i\pi + \mu_i > 0] \tag{5.13}$$

$$= x_i\beta + E[\varepsilon_i \mid z_i\pi + \mu_i > 0]$$

$$= x_i\beta + E[\varepsilon_i \mid \mu_i > -z_i\pi] \tag{5.14}$$

The implication from equation (5.14) is that if there is no correlation between the two error terms, then we can simply employ the usual OLS without suffering from biased estimation results. In the literature, researchers have relied on the Wald test to either reject or confirm the assumption of the dependence between the selection and outcome equations. If we reject this null hypothesis of independent equations and conclude that the two equations are rather dependent (so that $\rho \neq 0$), then the application of OLS will only yield inconsistent results. In such a scenario, the second component of equation (5.14) will not be zero and can, therefore, be estimated as:

$$E[\varepsilon_i \mid \mu_i > -z_i\pi] = \rho\sigma_\varepsilon \lambda(\alpha_u) \tag{5.15}$$

Where $\alpha_u = \frac{-z_i\pi}{\sigma_\mu}$; and $\lambda(\alpha_u) = \frac{\phi(-z_i\pi/\sigma_\mu)}{1-\Phi(-z_i\pi/\sigma_\mu)} = \frac{\phi(z_i\pi/\sigma_\mu)}{\Phi(z_i\pi/\sigma_\mu)}$

In the literature, the expression $\lambda(\alpha_u)$ is often termed as the inverse mills ratio (IMR).

This follows that the conditional mean in equation (5.14) can be re-specified as:

$$E[y_i \mid s^* > 0] = x_i\beta + \rho\sigma_\varepsilon \lambda(\alpha_u) \tag{5.16}$$

Therefore, with the presence of selection bias, the outcome equation (5.11) can now be re-defined in the following:

$$y_i \mid s^* > 0 = E[y_i \mid s^* > 0] + \omega_i \text{, where } \omega_i \text{ is the new error term} \tag{5.17}$$

$$= x_i\beta + \rho\sigma_\varepsilon \lambda(\alpha_u) + \omega_i \tag{5.18}$$

In the literature, other names have been given to this form of sample selection model. Among others, these include the Tobit model with stochastic threshold (Nelson, 1977), type 2 Tobit model (Amemiya, 1985, pp. 384), probit selection equation (Wooldridge, 2002, pp. 506) and Heckit estimator (Cameron & Trivedi, 2005, pp. 550).

The Heckman approach is not without any limitation (Heckman, 1979; Bushway et. al, 2007; Cameron & Trivedi, 2005, 2009). Generally, applying this approach requires that an exclusion restriction is satisfied. Thus, the exclusion criterion ensures that at least one variable in the selection equation do not directly influence the outcome equation. This criterion of identifiable variable(s) remains a critical challenge in the literature. In situations where all the variables in the selection equation also influence the outcome equation, the functional form may though be applied but not without the limitation of obtaining less robust estimates particularly for small sample analysis. The current study faces a challenge of identifying an ideal variable which influences the selection equation of participation in the labour market but does not influence the outcome equation of employment diversification. Thus, all variables that influence the participation equation seem to generally influences the diversification equation also. The study however addresses this limitation with the benefit of using a large sample size for the analysis on rural Ghana. Another potential challenge in the absence of exclusion restriction is that the estimates from the Heckman approach could lead to inflated standard errors. Similarly, the study addresses this limitation by applying the *robust* option (in Stata) to arrive at a more robust standard errors and hence, reliable parameter estimates.

5.1.4 Data source

This chapter uses data on rural Ghana. In particular, it employs datasets from both the fifth and seventh rounds of the Ghana Living Standards Surveys (GLSS5 in 2005/06 and GLSS7 in 2016/17) by the Ghana Statistical Service. The sampling procedure for GLSS5 is similar to that of GLSS7 which was discussed in chapter four. The successful total number of households that were interviewed for GLSS5 is reported to be 8,687, with the rural economy recording 5,069 households. On the other hand, as already indicated in chapter four, the successful number of households interviewed for GLSS7 is reported to be 14,009 with rural households being 7,991. Like chapter four, the analysis is limited to workers in the working age group of 15 years and older. Coupled with the presence of some missing values and generation of variables (particularly for the community factors like road, market and electricity), the study ended up with reduced samples of 3,020 and 4,793 rural households for GLSS5 and GLSS7, respectively. The definitions of dependent and independent variables used for this empirical chapter are presented in Table 5.1.

Table 5.1 Definitions of dependent and independent variables (for chapter 5)

Dependent variables	**Measure/definition**
E_{within_agric}	Weighted entropy index of employment diversification within the agricultural sector
$E_{within\_services}$	Weighted entropy index of employment diversification within the services sector
$E_{within\_industry}$	Weighted entropy index of employment diversification within the industry sector
$E_{across\_sectors}$	Weighted entropy index of employment diversification across the three major sectors: agriculture, industry and services
E_{Total}	Total entropy index of employment diversification (sum of weighted entropy indices for within and across groups)
Independent variables	
Heads and Households' characteristics	
Female head	This is a dummy with a value of 1 for female head and 0 otherwise
Age	This is a continuous variable for the age of household head
Married	This is a dummy variable for head's current marital status with a value of 1 if head is married and 0 otherwise
Christian, major religion	This is dummy variable with a value of 1 if head is a Christian and 0 otherwise
Akan, major ethnic group	This is a dummy variable with a value of 1 if head belongs to the major ethnic group (Akan) and 0 otherwise
Shares of educational levels	These are the shares of household members with no, basic, secondary and tertiary educational levels
Dependency ratio	This is a continuous variable for household dependency ratio
Household size	This is a continuous variable for household size.
Receives remittance	This is a dummy variable with a value of 1 if the household receives remittance and 0 otherwise
Landholding (per capita)	This measures per capita household land size (in hectare)
Community characteristics	
Seasonal migration	This is a dummy with a value of 1 if more people move into a community for temporal job and 0 otherwise
Distance to market	This measures the distance between a community and market (km)
Distance to financial institute.	This measures the distance between a community and financial institutions like banks and micro-finance (km)
Access to passable road	This is a dummy with a value of 1 if a community has a passable road and 0 otherwise
Access to electricity	This is a dummy with a value of 1 if a community has access to electricity (national grid) and 0 otherwise
Access to portable water	This is a dummy with a value of 1 if a community has access to portable water and 0 otherwise
Geography/location	
Ecological zone	This is a categorical variable for the three ecological zones in Ghana: coastal, forest and savannah

5.2 Selected descriptive statistics: The degree of rural employment diversification

As indicated in the methodology, this study employs an improved measure of diversification (thus, entropy index) to examine the extent of rural employment diversification within and across the three major sectors. All things being equal, the most recent survey (GLSS7) is likely to report more economic activities than the previous survey (GLSS5). This difference can be attributed primarily to two main reasons, among others. Firstly, in recent times, most rural areas of the country have reported increased participation in some economic activities, particularly in the non-farm sector as compared to the past (GSS, 2014, 2018). Secondly, the Ghana Statistical Service made some revision to the ISIC levels in the recent survey (GLSS7) in order to capture some specific economic activities. Hence, to minimise this potential challenge, the study focuses largely on the extent of employment diversification within and across the three key or major sectors of any economy (agriculture, industry and services). This is supported by the fact that the classification of economic activities within these three major sectors has always remained the same over the years (GSS, 2008, 2014, 2018).

The statistics on the average degree of employment diversification in 2005/06 and 2016/2017 are shown in Table 5.2. The results provide plausible answers to the first part of the second research question: What is the degree of employment diversification within and across the three major sectors (agriculture, services and industry) in rural Ghana? The analysis is provided separately for diversification for just main employment activities and that of combined/both main and secondary employment activities. The latter is expected to reveal relatively better information on the on-going employment diversification as it captures all secondary job holdings in rural Ghana. Thus, within the period under consideration, the Ghana Statistical Service reported a general

increase in rural secondary economic activities, particularly for trading and market-oriented skilled farming (like field and tree crops) while that of subsistence farming and elementary activities reported a fall within the same period (see GSS, 2008, 2014, 2018).

As argued in the methodology, the findings on employment diversification confirm the significance of weighting each of the within-group diversification indices by their relative shares in total rural employment. For instance, without applying such weights, the services and industry sectors respectively reported the highest degrees of diversification in 2005/06. However, with weighting, the findings show a higher employment diversification within the agricultural sector followed by services and industry sectors respectively for both years. Therefore, by relying on the weighted indices, the data indicates that diversification within the agricultural and services sectors increased within the period under consideration while that of the industry sector fell over the period. Also, within diversification (derived by summing up all the weighted within indices of the three major sectors) and across diversification reported an increase over the years. In general, the rural economy reported a rise in total employment diversification, which is also derived by summing up the indices for weighted-within and across diversification. For each survey year, the degree of (weighted) diversification within the industry and services sectors reported to be relatively higher for the combined main and secondary employment activities than just the main employment activities while that of agriculture reported a higher degree of diversification for considering just the main employment activities. Relatedly, across and total diversification reported lower degrees for considering only main employment activities relative to both main and secondary activities. These results underscore the earlier assertion of the

importance of accounting for secondary economic activities in the analysis of employment diversification.

Table 5.3 shows a statistical test of significant differences for weighted-within diversification among the three sectors. The test indicates a significantly higher average diversification within the agricultural sector than that of the industry and services sectors. Comparing industry and services, the latter reported a significantly higher diversification than the former. All these differences are significant at 1% significance level, regardless of the survey years. Also, the test results are regardless of whether we consider only the main employment or the combined main and secondary employment activities.

Table 5.2 Average entropy index of employment diversification, by sector

	Main activity		Main and secondary activity	
Entropy index	**2005/06**	**2016/17**	**2005/06**	**2016/17**
Unweighted-Within Agriculture	0.1280	0.4127	0.1628	0.3962
Unweighted-Within Industry	0.2259	0.1629	0.2258	0.2298
Unweighted-Within Services	0.2340	0.1683	0.2371	0.2008
Share-Agriculture	0.7810	0.7408	0.6066	0.6171
Weighted-Within Agriculture	0.1000	0.3058	0.0927	0.2465
Share-Industry	0.0918	0.0781	0.1872	0.1397
Weighted-Within Industry	0.0207	0.0127	0.0423	0.0362
Share-Services	0.1272	0.1853	0.2047	0.2468
Weighted-Within Services	0.0298	0.0312	0.0488	0.0516
Weighted Within (Total)	0.1505	0.3497	0.1837	0.3343
Across groups	0.2962	0.3420	0.4077	0.4219
Total Entropy Index (Weighted)	0.4467	0.6917	0.5914	0.7562

Source: Author's own computation from GLSS 5 and 7

Table 5.3 Cross-table of average differences in within entropy index (using the weighted values), by sector

		Main activity		Main and secondary activity	
Year	**Sector**	**Agriculture**	**Industry**	**Agriculture**	**Industry**
2005/06	Industry	0.079***	0	0.050***	0
	Services	0.070***	-0.009***	0.044***	-0.007***
2016/17	Industry	0.293***	0	0.210***	0
	Services	0.275***	-0.019***	0.195***	-0.015***

*Differences defined as column-line; *** p<0.01, ** p<0.05, * p<0.1*

5.3 Estimation results and discussion: Determinants of rural employment diversification

This section presents the empirical findings on the determinants of employment diversification among rural households in Ghana for the periods 2005/06 and 2016/17. The findings from the regression analysis provide some answers to the second part of the research question: What are the determinants of employment diversification within and across the three major sectors (agriculture, services and industry) in rural Ghana? As already indicated, the determinants are classified into three broad areas, namely, heads and households' characteristics, community characteristics and geographical location. Following from the above descriptive statistics, the study carries out determinants of employment diversification from two scenarios or angles: 1) just or only main employment activities; and 2) combined or both main and secondary employment activities. In most cases, the study finds the directional effects of the independent variables on employment diversification to be similar for the two scenarios but in terms of the magnitudes of the estimated coefficients, there seems to be a clear or appreciable difference. Therefore, based on the results from the descriptive analysis that the combination of main and secondary employment activities provides a better picture of the degree of employment diversification in rural Ghana (see Table 5.2), the rest of the discussion in this chapter will focus

primarily on the determinants of diversification from the second scenario (thus, combined/both main and secondary employment activities). With this, we can confidently estimate the extent of the effect of the independent variables on different components of employments diversification for rural Ghana. Estimates from the first scenarios are, however, report in the study's appendix (see Tables 5A1 and 5A2 in appendix).

The following presents the estimation results from the second scenario of combined main and secondary employment activities (see Tables 5.4 and 5.5 below). The estimates from the 2005/06 dataset are displayed in Table 5.4 while the estimates from the 2016/17 dataset are reported in Table 5.5. The columns 1, 2 and 3 present the estimates for the determinants of employment diversification within the agricultural, services and industry sectors respectively while columns 4 and 5 respectively present the estimates for across and total diversification. The 2016/17 results from the Wald test reject the null hypothesis of independent equations for all the components of diversification, apart from diversification within the industry sector. Regarding the 2005/06 estimates, the hypothesis is rejected for diversification within the agricultural sector and across the sectors. These findings confirm the importance of applying the Heckman Two-Step Estimator (HTSE) to address the problem of sample selection in a regression analysis (Cameron & Trivedi, 2005, 2009). The robust standard errors-which were obtained using the *robust* option in Stata-are reported in parentheses for all independent variables.

The estimation results from the total diversification provide some information on the general determinants of employment diversification: including gender, age, marital status, ethnicity, education, landholdings, seasonal migration and infrastructures such as distance to market,

access to electricity, passable road and portable water source, as well as geographical locations. However, these general determinants may not have a similar influence on the degree of diversification within and across the three sectors under consideration (agricultural, services and industry). Additionally, while a factor may be a significant determinant for a particular component (or type) of diversification it may not significantly or necessarily determine the extent of the general (or total) diversification in an economy. Hence, the rest of the discussion of the estimation results now focuses on the determinants of the remaining four types (or components) of rural employment diversification (see columns 1, 2, 3 and 4 in the same Tables 5.4 and 5.5).

Table 5.4 Determinants of the degree of rural employment diversification for the 2005/06 dataset (using entropy index for combined/both main and secondary employment activities)

Variables	(1) Agriculture	(2) Services	(3) Industry	(4) Across	(5) Total
Heads and households' characteristics					
Female head	-0.01607***	0.01081***	0.00212*	0.02385***	0.01888***
	(0.00287)	(0.00164)	(0.00119)	(0.00575)	(0.00518)
Age of head	0.00125***	-0.00057***	-0.00013	-0.00134**	0.00083
	(0.00033)	(0.00017)	(0.00013)	(0.00064)	(0.00060)
Age square/100	-0.00092***	0.00041**	0.00010	0.00083	-0.00143**
	(0.00032)	(0.00017)	(0.00012)	(0.00063)	(0.00059)
Married	-0.00067	0.00125	-0.00062	-0.00050	0.00555
	(0.00271)	(0.00150)	(0.00104)	(0.00560)	(0.00507)
Christian	-0.00195	0.00159*	0.00004	0.00370	0.00221
	(0.00174)	(0.00086)	(0.00060)	(0.00344)	(0.00277)
Akan, major ethnic group	0.00342	-0.00013	-0.00077	-0.00207	0.00164
	(0.00243)	(0.00128)	(0.00093)	(0.00518)	(0.00403)
Members with basic education, share	-0.01326***	0.00450**	0.00253**	0.02438***	0.02204***
	(0.00322)	(0.00175)	(0.00117)	(0.00650)	(0.00571)
Members with secondary education, share	-0.03449***	0.02253***	-0.00288*	0.07856***	0.06808***
	(0.00761)	(0.00513)	(0.00155)	(0.01761)	(0.01645)
Members with tertiary education, share	-0.09557***	0.05390***	0.00301	0.23856***	0.20079***
	(0.00786)	(0.00754)	(0.00368)	(0.02522)	(0.02565)
Dependency ratio	0.00218**	-0.00113**	-0.00015	-0.00326*	-0.00150
	(0.00098)	(0.00051)	(0.00035)	(0.00188)	(0.00142)
Household size	0.00024	0.00019	-0.00024**	-0.00063	-0.00036
	(0.00030)	(0.00014)	(0.00009)	(0.00061)	(0.00050)
Receives remittance	-0.00060	0.00034	-0.00008	-0.00085	-0.00230
	(0.00162)	(0.00082)	(0.00057)	(0.00331)	(0.00300)
Landholding (per capita)	0.46898***	-0.12327***	-0.09100***	-0.77766***	-0.34496***
	(0.11007)	(0.03613)	(0.02249)	(0.19752)	(0.11264)

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

Table 5.4 Continued: Determinants of the degree of rural employment diversification for the 2005/06 dataset (using entropy index for both combined/main and secondary employment activities)

Variables	(1) Agriculture	(2) Services	(3) Industry	(4) Across	(5) Total
Community characteristics:					
Seasonal migration	0.00642***	-0.00055	-0.00198***	-0.00538	0.00913***
	(0.00189)	(0.00095)	(0.00073)	(0.00392)	(0.00351)
Distance to marketplace	0.00010	-0.00003	-0.00008***	-0.00004	0.00014
	(0.00010)	(0.00005)	(0.00003)	(0.00020)	(0.00017)
Distance to financial institution	0.00005	-0.00000	-0.00000	-0.00010	-0.00010
	(0.00006)	(0.00003)	(0.00002)	(0.00014)	(0.00012)
Access to electricity (National grid)	-0.01065***	0.00442***	0.00060	0.01852***	0.01128***
	(0.00206)	(0.00106)	(0.00079)	(0.00440)	(0.00392)
Access to passable road	-0.00518***	0.00093	0.00148**	0.00782**	0.00742**
	(0.00158)	(0.00080)	(0.00058)	(0.00323)	(0.00294)
Access to portable water source	-0.00331*	0.00126	0.00014	0.00314	-0.00266
	(0.00171)	(0.00082)	(0.00063)	(0.00347)	(0.00312)
Community population (in terms of log)	-0.00261***	0.00034	0.00035	0.00455***	0.00261*
	(0.00080)	(0.00043)	(0.00029)	(0.00160)	(0.00146)
Ecological zone:(reference=savannah)					
Coastal	-0.01591***	0.00390**	0.00174	0.02457***	0.00641
	(0.00334)	(0.00181)	(0.00129)	(0.00667)	(0.00531)
Forest	-0.00054	-0.00095	0.00098	0.00039	0.00034
	(0.00231)	(0.00125)	(0.00075)	(0.00493)	(0.00382)
Constant	0.08221***	0.01350***	0.00644*	0.39018***	0.43998***
	(0.00958)	(0.00523)	(0.00329)	(0.01881)	(0.01691)
Observations	3,020	3,020	3,020	3,020	3,020
Wald chi2 (22)	639.39	260.11	84.28	416.86	286.11
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000
Wald test of indep. eqns. ($\rho = 0$): chi2 (1)	3.76	0.25	0.54	0.14	590.17
Prob > chi2	0.0525	0.6203	0.4623	0.7116	0.0000

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

Table 5.5 Determinants of the degree of rural employment diversification for the 2016/17 dataset (using entropy index for combined/both main and secondary employment activities)

Variables	(1) Agriculture	(2) Services	(3) Industry	(4) Across	(5) Total
Heads and households' characteristics:					
Female head	-0.01822***	0.00768***	0.00193**	0.01244***	0.00688*
	(0.00652)	(0.00150)	(0.00079)	(0.00298)	(0.00417)
Age of head	0.00333***	-0.00049***	-0.00013	0.00064*	0.00233***
	(0.00086)	(0.00019)	(0.00009)	(0.00034)	(0.00062)
Age square/100	-0.00217***	0.00028	0.00005	-0.00129***	-0.00192***
	(0.00082)	(0.00018)	(0.00009)	(0.00032)	(0.00060)
Married	-0.01828***	0.00278**	0.00075	0.00672**	-0.00722*
	(0.00611)	(0.00137)	(0.00071)	(0.00282)	(0.00404)
Christian	0.01202**	-0.00159	-0.00048	-0.00357*	0.00418
	(0.00495)	(0.00104)	(0.00049)	(0.00205)	(0.00369)
Akan, major ethnic group	-0.01436***	0.00041	-0.00209***	-0.00169	-0.01761***
	(0.00537)	(0.00114)	(0.00061)	(0.00244)	(0.00378)
Members with basic education, share	-0.03183***	0.00623***	0.00453***	0.01780***	-0.00373
	(0.00780)	(0.00185)	(0.00109)	(0.00352)	(0.00534)
Members with secondary education, share	-0.04894***	0.01501***	0.00011	0.04600***	0.01103
	(0.01407)	(0.00331)	(0.00136)	(0.00805)	(0.00879)
Members with tertiary education, share	-0.20319***	0.05681***	-0.00046	0.13881***	-0.00082
	(0.01738)	(0.00587)	(0.00265)	(0.01263)	(0.01119)
Dependency ratio	-0.00138	0.00056	0.00037	0.00048	-0.00004
	(0.00255)	(0.00064)	(0.00028)	(0.00104)	(0.00175)
Household size	0.00038	0.00001	-0.00014**	0.00022	0.00042
	(0.00072)	(0.00014)	(0.00006)	(0.00032)	(0.00053)
Receives remittance	-0.00286	0.00050	0.00026	0.00208	-0.00044
	(0.00456)	(0.00101)	(0.00052)	(0.00210)	(0.00318)
Landholding (per capita)	-0.02103*	0.00017	-0.00179***	-0.00786*	-0.03124**
	(0.01217)	(0.00290)	(0.00053)	(0.00471)	(0.01274)

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

Table 5.5 Continued: Determinants of the degree of rural employment diversification for the 2016/17 dataset (using entropy index for combined/both main and secondary employment activities)

Variables	(1) Agriculture	(2) Services	(3) Industry	(4) Across	(5) Total
Community characteristics:					
Seasonal migration	0.01010**	-0.00225**	-0.00151***	0.00061	0.00472
	(0.00477)	(0.00097)	(0.00049)	(0.00213)	(0.00339)
Distance to marketplace	0.00024**	-0.00004*	-0.00001*	-0.00007*	0.00010
	(0.00010)	(0.00002)	(0.00001)	(0.00004)	(0.00007)
Distance to financial institution	0.00016	-0.00005*	-0.00003**	-0.00007	0.00001
	(0.00015)	(0.00003)	(0.00001)	(0.00006)	(0.00011)
Access to electricity (National grid)	-0.02626***	0.00136	0.00142***	0.00222	-0.02046***
	(0.00487)	(0.00098)	(0.00049)	(0.00205)	(0.00355)
Access to passable road	-0.01086***	0.00274***	0.00059	0.00635***	0.00014
	(0.00421)	(0.00090)	(0.00051)	(0.00194)	(0.00292)
Access to portable water source	0.01333**	0.00053	0.00085*	0.00154	0.01649***
	(0.00550)	(0.00104)	(0.00049)	(0.00219)	(0.00419)
Community population (in terms of log)	-0.00187	0.00139**	-0.00007	0.00177*	0.00146
	(0.00225)	(0.00056)	(0.00027)	(0.00103)	(0.00150)
Ecological zone:(reference=savannah)					
Coastal	-0.02781***	0.00478**	0.00250***	0.01868***	-0.00018
	(0.00839)	(0.00205)	(0.00097)	(0.00380)	(0.00566)
Forest	-0.02013***	-0.00164	0.00087	0.01093***	-0.00987**
	(0.00569)	(0.00107)	(0.00064)	(0.00254)	(0.00399)
Constant	0.21497***	0.00786	0.00657**	0.35925***	0.60818***
	(0.02594)	(0.00551)	(0.00327)	(0.01090)	(0.01820)
Observations	4,793	4,793	4,793	4,793	4,793
Wald chi2 (22)	497.01	326.70	114.80	359.29	153.69
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000
Wald test of indep. eqns. ($\rho = 0$): chi2 (1)	3.25	4.46	2.20	4.9e+05	3.4
Prob > chi2	0.0714	0.0346	0.1377	0.0000	0.0653

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.*1*

5.3.1 Heads and households' characteristics

Gender of household head

The estimation results point to a significant influence of gender on employment diversification among rural households in Ghana. The estimates show that being a female-head of a household is characterised by a stronger degree of diversification across the agricultural, services and industry sectors than being a male-head. Thus, the estimates reveal that being a female-head relative to being a male-head significantly increases the entropy index for diversification across the sectors by about 0.02385 and 0.01244 in 2005/06 and 2016/17, respectively. In terms of the within diversification, a female-head is found to be associated with a higher diversification in the non-farm sectors (services and industry), particularly for services, than the male counterpart. On the other hand, a male-head tends to increase diversification in the agricultural sector than the female counterpart. Simply, the estimates from the 2005/06 dataset indicates that being a female-head rather than being a male-head significantly decreases the index for employment diversification within the agricultural sector by 0.01607 but increases that of services and industry sectors by 0.01081 and 0.00212, respectively. Estimates from the 2016/17 sample revealed that being a female-head relative to being a male-head also significantly decreases the degree of employment diversification within the agricultural sector by 0.01822 but improves that of services and industry by 0.00768 and 0.00193, respectively.

While the finding contradicts prior evidence on rural Peru which found no significant gender differences in diversification (Escobal, 2001), it however confirms prior studies on rural Ghana (Newman & Canagarajah, 2000; Senadza, 2010). A plausible explanation to the study's finding is the fact that data from the Ghana Statistical Service supports a higher fraction of females than

males who are engaged in wholesale and retail services while their male counterparts dominate in agricultural employment (GSS, 2008, 2014). Also, the greater degree of diversification among females in the non-farm sectors seem to provide some explanation to previous findings of a higher share of non-farm income among female-headed households than male-headed households (Canagarajah et al., 2001; Senadza, 20011). Further, the recognised lower incidence of poverty among female-headed households than male-headed households in Ghana (GSS, 2008, 2014, 2018) could be due to the fact that non-farm employment income contributes more to poverty reduction than income from agricultural employment (Senadza, 2010, 2011; Ackah, 2013).

Marital status of household head

The marriage variable seems to also provide some explanation to the observed rural diversification, particularly in the more recent survey period, 2016/17. Thus, estimates from the 2016/17 dataset indicates that being a married household head relative to being unmarried head tends to significantly increase the entropy index for employment diversification across the sectors by about 0.00672. Within the sectors, marriage significantly decreases and increases the index for diversification within the agricultural and services sectors by 0.01828 and 0.00278, respectively. Some plausible reasons can be given to this finding. In general, marriage can be said to be associated with a greater financial responsibility, particularly in a developing country like Ghana where the extended family seem to depend largely on the nuclear family. Consequently, married couples may decide to increase their investment of economic resources in the non-farm sector in order to get a relatively higher return than just depending solely on income from agricultural employment which is associated with higher volatility.

Education of household members

The results from the study show a significant effect of education on employment diversification, with the effect being stronger for tertiary education followed by secondary and primary education, respectively. As indicated in Table 5.1, the educational variables are measured in terms of the shares of household members with no, basic, secondary and tertiary education. In terms of the entropy index for employment diversification across the sectors, the analysis revealed that relative to the share of no education, a higher share of household members with basic, secondary and tertiary education exerted a significantly positive effect of 0.02438, 0.07856 and 0.23856 respectively in 2005/06, 0.01780, 0.04600 and 0.13881 respectively in 2016/17. The within sector analysis reveals a differential role of education such that relative to the share of no education, having a higher share of household members with at least basic education significantly decreases the degree of employment diversification within the agricultural sector but increases that of the other two non-farm sectors, particularly for services. For instance, relative to the share of no education, a higher share of household members with basic, secondary and tertiary education significantly reduces the extent of employment diversification within the agricultural sector by 0.01326, 0.03449 and 0.09557 respectively in 2005/06, 0.03183, 0.04894 and 0.20319 respectively in 2016/17. In contrast, relative to the share of no education, a higher share of household members with basic, secondary and tertiary education significantly increases the extent of employment diversification within the services sector by 0.00450, 0.02253 and 0.05390 respectively in 2005/06, 0.00623, 0.01501 and 0.05681 respectively in 2016/17.

The study's findings on the significant relationship between rural diversification and education are consistent with prior evidence on Peru (Escobal, 2001), Mali (Abdulai & CroleRees, 2001),

Uganda (Canagarajah et al., 2001) and that of Ghana (Senadza, 2010, 2012). Based on the prediction from the human capital theory, education is said to generally empower or increase the knowledge capacity and awareness of households to make informed decision and hence, identify profitable economic activities among other alternatives as compared to having no education. Following from the diversification theory (which was discussed in chapter 3), while a higher education pulls households to diversify into better investment and employment opportunities that of no education rather pushes them into diversification for the primarily purpose of maintaining or securing the consumption pattern of their households. By implication, the negative effect of education on employment diversification within the agricultural sector could be attributed to its recognised low productivity, high post-harvest losses and other numerous challenges relative to the non-farm sector in many rural areas across the country (GSS, 2008, 2014, 2018; Senadza, 2010, 2011, 2012). Nevertheless, these findings contradict the previous evidence by Canagarajah et al. (2001) who rather found an insignificant effect of education on diversification in the non-farm sector for rural Ghana. As pointed out earlier, such contradiction may largely result from the differences in the measures of rural diversification and datasets used by different empirical studies in the literature.

Household receipt of remittance

The effect of remittance on employment diversification is found to be insignificant. The study by Senadza (2010, 2012) rather found a negative relationship between remittances and non-farm income participation. A suggested reason could be that rural households may intend rely on remittances to smoothen their consumption rather than investing in some economic activities.

This assertion seems to be confirmed by empirical chapter four which showed a significant positive effect of remittances on consumption welfare, particularly for rural households.

Household Landholdings

The findings from the study contribute to the debate on the directional effect of landholdings on household diversification. The 2005/06 results show that landholdings (per capita) increase the entropy index for diversification within the agricultural sector by 0.46898 but decrease that of the services and industry sectors and across sectors by 0.12327, 0.09100 and 0.77766, respectively. This finding is consistent with the evidence by Barret et al. (2000), Escobal (2001) and Senadza, (2010, 2012). Nevertheless, the results are however different for the 2016/17 dataset. In particular, the study finds that household landholdings rather decrease the degree of employment diversification within the agricultural sector by 0.02103 and continue to decrease diversification within the industry sector and across the sectors by 0.00179 and 0.00786, respectively; its effect in the services sector is positive but not significant. The findings somehow imply that the important role of landholdings in explaining agricultural diversification in rural Ghana seems to deteriorate over the past decade under consideration, 2005-2017. A plausible reason could be due to scarcity of land and land tenure problems among rural households in a typical rural community. Another reason that has been cited in the literature is that the importance of households' landholdings to rural diversification tends to diminish when other factors are accounted for in a regression model (Reardon et al., 2006).

Other heads and households' characteristics

The relationship between employment diversification and age is found to be largely non-linear. For instance, evidence from the 2005/06 and 2016/17 samples points to a significant inverted U-shaped relationship between employment diversification within the agricultural sector and the age of the head of household. This implies that diversification within the agricultural sector increases with age but at a decreasing rate. On the other hand, the relationship between employment diversification within the services sector and the age variable is found to be U-shaped, particularly from the 2005/06 sample. In the rural setting, the agricultural sector is highly labour intensive which require a stronger physical strength than the services sector which is primary trading activities. All things being equal, as people get older, they are likely to be engaged in a more flexible employment in the services sector than to rely heavily on agricultural employment. Further, the findings also place some emphasis on the role of religious and ethnic background of the household head, particularly from the more recent dataset in 2016/17. Religion and ethnicity are generally structural and sometimes circumstance variables which influence the socio-economic decisions – such as diversification strategies - of agents who are often the individuals and households (in this study) within and across the different structures, classes or groups. Household size and dependency ratio seem to play a weak role in explaining recent diversification in rural Ghana.

5.3.2 Community characteristics/factors

Seasonality: Seasonal migration

The study's findings confirm the argument that seasonality plays a key role in the diversification process among rural households (Sahn, 1989; Barret et al, 2001; Ellis, 2000). Evidence from the

2005/06 sample indicates that seasonal migration tends to significantly increase and decrease the entropy index for employment diversification within the agricultural and industry sectors by 0.00642 and 0.00198, respectively. In the same vein, results from the 2016/17 sample show that seasonal migration significantly increases the degree of employment diversification within the agricultural sector by 0.01010 but decreases that of the services and industry sectors by 0.00225 and 0.00151, respectively. These findings seem to suggest that some households that live elsewhere (in other communities, towns and cities) may migrate to the rural areas during the crop or farming season. In other words, during this period, these communities experience some large inflow of migrants (particularly returned migrants) for the primary purpose of agricultural activities than non-farm activities. Also, during this period, existing farm households may want to intensify their diversification in their farming sector in order to make the best out of the season. Even existing households that may be engaged in some form of non-farm economic activities like trading are also likely to divert part (if not all) of their attention and resources to the agricultural sector.

Infrastructural indicators

Infrastructures remain important in the development stages of a nation. The rural economy also thrives on certain infrastructural indicators for its development. This empirical chapter considers the role of the following infrastructures in the observed rural employment diversification: distance to market, distance to financial institution (like banks and micro-finance), access to electricity, passable (or good) road and portable water sources. The findings suggest some differential effects of these infrastructures on rural diversification. In order words, improved infrastructures seem to encourage a greater degree of employment diversification across the

sectors and within the non-farm sectors but largely discourage diversification within the agricultural sector, apart from access to portable water source which somehow improved agricultural diversification in 2016/17. More specifically, the estimation results show that access to electricity and passable road significantly lower the degree of employment diversification within the agricultural sector by 0.01065 and 0.00518 respectively in 2005/06, 0.02626 and 0.01086 respectively in 2016/17. This finding is similar to the effect of marketplace and financial institutions, particularly in the more recent period. In other worlds, evidence from the 2016/17 dataset shows that an increase in the distance (in terms of kilometres) to marketplace and financial institution away from the rural community discourages employment diversification within the non-farm sectors. On the other hand, a significantly positive relationship is rather established between diversification within the agricultural sector and distance to marketplace, particularly in 2016/2017.

The implication from these findings is that as the rural economy develops in terms of infrastructures, it tends to create better employment opportunities for rural households in the non-farm sector. Following the predictions from the Lewis theory of structural transformation (see Todaro & Smith, 2015, pp.124), rural communities that receive these improved infrastructures may end up been characterised by the modern sector (in this case services and industry) while those that lack such development may be trapped in the tradition sector (in this case agriculture). In a similar line of argument, the study by Escobal (2001) on rural Peru claimed that while infrastructures may generally promote the farm and non-farm sectors altogether, the gains are found to be largely higher for the latter than the former. Prior evidence on rural Ghana provides some support to the study's findings of the relationship between

infrastructural development and non-farm diversification (Newman & Canagarajah, 2000; Canagarajah et al., 2001; Senadza, 2012).

Community population (in log)

The size of the population for a rural community matters in understanding diversification. The results from the 200/06 sample shows that a 10 percent increase in community's population size significantly decreases the entropy index for employment diversification within the agricultural sector by 0.000261 but increases diversification across the sectors by 0.000455. In the most recent survey, 2016/17, the estimates indicate that a 10 percent increase in the population of a rural community increases the entropy index for employment diversification within the services sector and across sectors by 0.000139 and 0.000177, respectively; its effect for the agricultural sector is negative but insignificant.

The results seem to imply that the size of a population could either be a pull or push factor (Barret et al., 2001). Basic economic theory tells us that population matters in explaining the behaviour of demand and supply curves or functions. For instance, an increase in the population may in tend create excess demand for a particular commodity, holding supply constant. In a nearly perfect competitive market, existing suppliers/producers could make some profit in the short term. Thus, this situation is said to be transitional or temporary as new suppliers/producers are also pulled by the gains in the market. In reality, this assumption may not always hold for the agricultural sector as a significant number of rural households often consume from their own agricultural produce than buying from their neighbours. Rather, an increase in rural population itself, all things being equal, could even drive away some individuals to rather embark on

alternative economic activities. This is primary due to challenges such as low price for agricultural produce, post-harvest losses and land tenure problems which are even likely to be worsened as a result of the excess labour supply emanating from the increase in the rural population (Barret et al., 2001). Consequently, these challenges could push some existing or potential farmers to diversify across the sectors rather than just depending on the agricultural sector as their only sources of employment income.

5.3.3 Geographical location: Ecological zones

The results from the study point to the significant role of ecological zones in explaining rural diversification in Ghana. For instance, the 2016/17 sample indicates that living in the coastal zone or belt relative to living in the savannah zone significantly decreases the entropy index for employment diversification within the agricultural by 0.02781 but increases that of the services, industry and across the sectors by 0.00478, 0.00250 and 0.01868, respectively. Also, living in the forest zone relative to living in the savanna zone significantly decreases the entropy index for diversification within the agricultural sector by 0.02013 but increases across diversification by 0.01093. Previous findings on rural Ghana do confirm the importance of ecological zones in rural diversification (Canagaraja et al., 2001; Senadza, 2012). These studies found that households in the coastal and forest zones tend to receive a higher non-farm employment income relative to their counterparts in the savannah zone.

In Ghana, like many other developing countries, the rural economy is primarily associated with agriculture. However, there seems to be some clear differences among the three ecological locations. Comparatively, the savannah zone is less developed with relatively higher incidence of

poverty than the forest and coastal zone (GSS, 2014, 2018). While the forest and savannah zones are dominated by field and tree crops that of the coastal zone is noted for fishing and trading activities. However, over the years, some rural households in these zones seem to invest much of their time, energy and resources in diverse economic activities than focusing just on their principal occupations (GSS, 2008, 2014, 2018). The results seem to suggest that the savannah zone is still characterised with greater degree of employment diversification within the traditional sector of employment. Given that the non-farm sector contributes more to reducing rural poverty than the farm sector (Ravallion & Datt, 2002; Ersado, 2006, Ackah, 2013), policies that encourage diversification across the sectors and in particular, within the non-farm sector should be promoted in the savannah belt of the country.

5.4 Chapter summary

This study provided a better understanding on the degree and determinants of employment diversification in rural Ghana. It contributed to the literature by relying on the entropy index to understand the degree and determinants of employment diversification within and across the agricultural, services and industry sectors. Results from the entropy index revealed a greater degree of employment diversification within the agricultural sector and this was followed by the services and industry sectors, respectively. The descriptive statistics also reported of a general increase in employment diversification over the years.

Regarding the regression analysis, the study established certain key factors to be the determinants of the observed employment diversification in the rural Ghana. These included gender, marital status, age, education, landholdings, seasonal migration and infrastructural indicators like road, electricity, market and financial institutions. However, these factors tended

out to have different influence on different components of diversification. For instance, being a female-head relative to being a male-head lowers employment diversification within the agricultural sector but increases diversification within the non-farm sectors (services and industry). Also, infrastructural development in the rural community was found to favour a higher degree of employment diversification in the non-farm sectors as compared to the traditional/agricultural sector. Further, it came to light that education significantly decreased households' diversification within the agricultural sector but increased that of the non-farm sectors.

Based on the study's findings, it is recommended that for rural households to experience a greater degree of diversification in the non-farm sectors (services and industry), policy makers should promote policies on infrastructural development across the rural communities. For instance, a particular attention should be geared towards the expansion or development of market centres, financial institutions (such as banks and micro-finance), electricity and improved road in the rural areas. The proximity of infrastructures such as financial institutions and market centres should be taken into account since longer distance away from rural communities is found to discourage non-farm diversification. Policy makers should pay a particular attention towards improvement in non-farm diversification in the savannah belt of Ghana. Thus, the savannah zone seems not to respond to the on-going rural diversification in the non-farm sectors. Further, the observed negative linkage between diversification in the agricultural sector and human capital should be properly addressed through policy intervention and public re-orientation. By encouraging educated youth into the agricultural sector, the country can minimise the socio-economic cost of the large numbers of unemployed graduates. To attract a good number of these

graduates, the government, in collaboration with other stakeholders, should aim at providing them with different forms of assistance including training, credit and ready market.

CHAPTER SIX

ACCOUNTING FOR RURAL INEQUALITY AND ITS CHANGE: THE ROLE OF EMPLOYMENT DIVERSIFICATION

6.0 Introduction

This chapter seeks to analyse the third specific research objective of the thesis. Simply put, it aims to examine how employment diversification explains consumption inequality among households in rural Ghana. The related research question to this objective is: How does employment diversification within and across the three major sectors influence the level of rural inequality and its change over the years? Following from the findings in empirical chapter five, this chapter seeks to find out the extent to which employment diversification within and across the agricultural, services and industry sectors influence rural inequality in Ghana. Similar to chapter five, the analysis shall be undertaken using the 2005/06 and 2016/17 GLSS datasets. With this, we can estimate the differential contributions of employment diversification to the level of inequality in each time period, as well as the change in inequality between the two periods. This analysis is very crucial as the rural economy of Ghana continues to report increasing levels of inequality over the past decades, aside the on-going structural changes in its labour market. With findings from the study, we can at least provide some clear understanding of the component or type of employment diversification that has contributed to either worsening or improving the distribution of income in rural Ghana.

The literature review chapter pointed to some revealing findings on the effect of diversification on rural inequality. The empirical findings were, however, found to be mixed (Reardon et al., 2000; Canagarajah et al., 2001; de Janvry & Sadoulet 2001; Zhu & Luo 2006; Senadza, 2011; Scharf & Rahut, 2014). Some reasons that were cited in explaining these apparent contradictions were differences in the: 1) measures of diversification; 2) indicators of welfare; and 3) estimation techniques used by different authors (Canagarajah et al., 2001; Senadza, 2011; Scharf & Rahut, 2014). To contribute to the on-going debate, this study employs a better measure of diversification (using an entropy index), consumption welfare and recently developed decomposition technique to examine how different aspects of employment diversification might explain Ghana's rural inequality.

The rest of this chapter is organised in the following sub-sections. While the first sub-section focuses on methodology, the second and third sub-sections present discussion of results from the descriptive and regression-based decomposition analysis, respectively. The last sub-section provides a summary for the chapter with a brief policy recommendation.

6.1 Methodology

6.1.1 A regression-based decomposition approach

This study employs Fields (2003) decomposition technique to analyse the contribution of factors to rural inequality. Specifically, the approach examines the extent to which a factor contributes to the: 1) level of total inequality at a given time period; and 2) change or difference in inequality between any two periods. Originally, Fields (2003) approach was developed using an income function to examine the contribution of a factor to income inequality in the United States of America. According to Fields (2003), the approach can be applied to any other continuous dependent variable. For example, Liu (2008) and Gunatilaka and Chotikapanich (2009) have applied this approach to analyse consumption inequality. Since the literature has highlighted consumption as an appropriate measure of economic well-being in a developing country context (Deaton, 1997; Deaton & Zaidi, 2002; Duclos & Araar, 2006; Gunatilaka & Chotikapanich, 2009; Chang, 2012), this study employs a consumption approach.

Many factors are argued to influence the distribution of income among households. These factors cut across socio-economic variables including age, sex, education, employment, dependency ratio; and geographical variables including location and region (Cutler & Katz, 1992; Canagarajah, 2001; Senadza, 2011; Chang, 2012; Agesa et al., 2009, 2013; Akaakohol & Aye, 2014; Brewer & Wren-Lewis, 2016; Agyire-Tettey et al., 2018). Of particular interest is the effect of employment diversification on rural inequality. This chapter uses the same measure or definition of employment diversification from the entropy index discussed in the preceding chapter. By relying on the entropy index, this chapter can estimate the extent to which employment diversification within and across the three major sectors (agriculture, industry and services) contribute to the level of rural inequality and its change over time. A priori,

diversification within the agricultural and services sectors is postulated to be inequality-reducing while that of industry sector is predicted to be inequality-increasing. On the other hand, diversification across sector is expected to exert positive effect on inequality while the net effect of diversification is expected to be inequality-increasing. Some plausible explanations can be given to these a priori signs. For instance, employment activities within agriculture (mostly crop and tree farming, rearing of animals, etc) and services (mostly trading) are less capital intensive as compared to the industry sector. As a result, a sizeable number of poor households can benefit from agricultural and services activities and thereby lead to improvement in income distribution. Prior to 2006, Ghana's growth was primary driven by the agricultural sector where a large number of rural households receive their employment income. However, as indicated in the overview (chapter 2), since 2006, the services sector has remained the major contributor to GDP while the industrial sector has now overtaken the agricultural sector since 2012. Richer households are likely to benefit from the industry sector and this is partly due to the relatively higher capital and skill requirement which hinder the poor and consequently result in welfare disparities. These patterns of structural changes in the economy may explain why the country's growth performance across the sectors may not necessarily be pro-poor and inclusive (GSS, 2018). Therefore, the extent of diversification across these major sectors is likely to worsen inequality and possibly outweigh the expected welfare gains from the agriculture sector and hence, the net effect of total diversification on rural inequality could be predicted to be positive.

6.1.1.1 Accounting for level inequality

Suppose a standard consumption function for a typical household at time t is defined in the form:

$$\ln Y_{it} = \alpha_t + \sum_j \beta_{jt} X_{ijt} + \varepsilon_{it} \quad (6.1)$$

Where $\ln Y$ is the log of per adult equivalent real consumption of household; α is the constant/intercept term; β is a vector of the coefficients to be estimated; X is a vector of explanatory variables that determines consumption; and ε is the error term.

Alternatively, the above consumption function in equation (6.1) can be simplified as:

$$\ln Y_{it} = a'_t Z_{it} \quad (6.2)$$

Where a_t is a vector of all parameters (α and β); and Z_{it} as a vector of all factors or determinants of consumption (which includes the error term, ε).

Assume $\ln Y$ to be the only random variable so that equation (6.2) can be redefined in the following:

$$\ln Y = \sum_{j=1}^{J+2} a_j Z_j \quad (6.3)$$

So that

$$\operatorname{cov}\left[\sum_{j=1}^{J+2} a_j Z_j, \ln Y\right] = \sum_{j=1}^{J+2} \operatorname{cov}\left[a_j Z_j, \ln Y\right] \quad (6.4)$$

Since the covariance between a variable (in this case, $\ln Y$) and itself is just the variance of that variable,

$$\sigma^2(\ln Y) = \sum_{j=1}^{J+2} \text{cov}\left[a_j Z_j, \ln Y\right] \tag{6.5}$$

Dividing both sides of equation (6.5) by $\sigma^2(\ln Y)$ yields the expression:

$$100\% = \frac{\sum_{j=1}^{J+2} \text{cov}\left[a_j Z_j, \ln Y\right]}{\sigma^2(\ln Y)} = \sum_{j=1}^{J+2} s_j(\ln Y) \tag{6.6}$$

Where $s_j(\ln Y)$ defines the relative factor inequality weight or contribution of factor j to the total level of inequality. It can, therefore, be deduced that:

$$s_j(\ln Y) = \text{cov}[a_j Z_j, \ln Y] / \sigma^2(\ln Y) = \frac{a_j \times \sigma(Z_j) \times cor[Z_j, \ln Y]}{\sigma(\ln Y)} \tag{6.7}$$

Similar to other decomposition techniques like Oaxaca (1973), Blinder (1973) and Fortin et al. (2011), this approach allows researchers to estimate the contribution of each independent variable to the component of inequality that is explained or due to covariate effect. This component is equivalent to the R^2 from a regression which explains the inequality that is due to the independent variables in a model. The remaining component of the inequality then gives the residual effect. Therefore, by excluding the error term (or the residential effect), the part of the inequality that is explained by all independent variables or factors can be expressed as:

$$\sum_{j=1}^{J+1} s_j(\ln Y) = R^2(\ln Y) \tag{6.8}$$

Following this, the contribution of the j^{th} independent factor to the explained component, denoted by $P_j(\ln Y)$, can be obtained as:

$$P_j(\ln Y) \equiv \frac{s_j(\ln Y)}{\sum_{j=1}^{J+1} s_j(\ln Y)} \equiv \frac{s_j(\ln Y)}{R^2(\ln Y)} \tag{6.9}$$

This approach shows that the contribution of a factor to inequality can primarily be determined by three key effects: factor coefficient; covariance between a factor and the dependent variable (log of per adult equivalent real consumption); and variance of the dependent variable. On the assumption that variance is often problematic in research analysis (see Foster & Ok, 1999; Fields 2003), the approach is developed to account for different measures of inequality so as to check for the consistency and robustness of findings (Fields, 2003). Fields (2003) maintains that the factor contributions, $s_j(\ln Y)$ and $P_j(\ln Y)$, remain the same for a wider group of inequality measures, $I(\ln Y_1,...,\ln Y_N)$, that is also continuous and satisfy the symmetric assumption such that $I(\mu,\mu,\mu,...,\mu)=0$, where μ is the mean value. For example, both the $s_j(\ln Y)$ and $P_j(\ln Y)$ which are obtained from the log variance of any continuous variable remains always the same as those of Gini coefficient, Generalised entropy family and other group of inequality measures which satisfy the same conditions (Fields, 2003).

6.1.1.2 Accounting for change (or difference) in inequality

Not only does the approach estimate factor's contribution to inequality at levels, but more so the change in inequality between any two periods or datasets. This allows researchers to tell which factor contributes most or least to an observed change in inequality. Unlike the level inequality, the estimates for factor's contribution to a change in inequality are argued to be somewhat depended on inequality measure used (Fields, 2003). Empirical studies that have applied a

regression-based approach, particularly the method by Fields (2003), have often used the Gini coefficient as an alternative measure of inequality in their analysis (see for example, Fields, 2002, 2003, Liu, 2008; Gunatilaka & Chotikapanich, 2009). Hence, following the literature, this study uses both log variance and Gini coefficient as measures of consumption inequality to estimate the percentage contribution of factors to the change in Ghana's rural inequality between 2005/06 and 2016/17.

Define $I(.)$ to be a particular measure of inequality so that the change in inequality between two time periods, t and t+1, can be defined in the following as:

$$I(.)_{t+1} - I(.)_t = [s_{j,t+1} \times I(.)_{t+1}] - [s_{j,t} \times I(.)_t] \tag{6.10}$$

So that the contribution of the j[th] factor to a change in inequality, denoted by Π_j, can be simplified as:

$$\Pi_j(I(.)) = \frac{[s_{j,t+1} \times I(.)_{t+1}] - [s_{j,t} \times I(.)_t]}{I(.)_{t+1} - I(.)_t} \tag{6.11}$$

Unlike factor's contribution to level inequality, Π_j is clearly dependent on the type of inequality measure, $I(.)$, given the $s_j(\ln Y)$ for each period. It, therefore, implies from equation (6.11) that by summing up all the individual factor contributions to the change in inequality, the following expression can be obtained:

$$100\% = \frac{\sum_{j}\{[s_{j,t+1} \times I(.)_{t+1}] - [s_{j,t} \times I(.)_{t}]\}}{I(.)_{t+1} - I(.)_{t}} = \sum_{j} \Pi_{j}(I(.)) \quad (6.12)$$

6.1.2 Data source

Similar to chapter 5, this chapter uses data on rural Ghana. In particular, it employs data from both the fifth and seventh rounds of the Ghana Living Standards Surveys (GLSS5 in 2005/06 and GLSS in 2016/17) by the Ghana Statistical Service. The sampling procedures for GLSS5 and GLSS7 have already been discussed in the earlier chapters four and five. As in the case of the previous empirical analyses in chapters four and five, the analysis in this chapter is also limited to workers in the working age of 15 years and older. Due to some missing data points and generation of certain variables, the study ended up with reduced samples of 4,439 and 7,216 rural households for GLSS5 and GLSS7, respectively. The definitions of dependent and independent variables used for this chapter are presented in Table 6.1.

Table 6.1 Definitions of dependent and independent variables (for chapter 6)

Dependent variable	**Measure/definition**
Log of Y	This is the log of per adult equivalent real consumption of rural household
Interest variables	
E_{within_agric}	Weighted entropy index of employment diversification within the agricultural sector
$E_{within\_services}$	Weighted entropy index of employment diversification within the services sector
$E_{within\_industry}$	Weighted entropy index of employment diversification within the industry sector
$E_{across\_sectors}$	Weighted entropy index of employment diversification across the three major sectors: agriculture, industry and services
Controls:	
Family factors	
Shares of educational levels	These measure the shares of household members with no, basic, secondary and tertiary educational levels
Female	This is a dummy with a value of 1 for female head and 0 otherwise
Age	This measures the age of household's head
Religion	This is a categorical variable for head's religion: Christian, Muslim and other religion
Ethnicity	This is a categorical variable for head's ethnic group: Akan, Ga-Dangme, Ewe and other ethnic groups
Marital status	This is a categorical variable for head's current marital status: married, divorced/widow and single
Dependency ratio	This is a continuous variable for household dependency ratio
Non-labour income	It takes the value of 1 if the household receives any form of non-labour income: remittances, rental income (from land and farm equipment) and others (like pension benefit) and 0 otherwise
Household size	This is a continuous variable for household size
Geography	
Ecological zone	This is a categorical variable for ecological zones: Forest, Coastal and Savannah areas
Region	This is a categorical variable for the ten administrative regions of the country: Western, Central, Greater Accra, Volta, Eastern, Ashanti, Brong-Ahafo, Northern, Upper East and Upper West

6.2 Selected descriptive statistics

6.2.1 Rural consumption inequality: Using different inequality measures

The sample shows a higher rural consumption inequality in 2016/17 than 2005/06, indicating a rise in inequality over the period (Table 6.2). This observation holds for all the measures of inequality used in this study, though with expected differences in their magnitudes. More specifically, from 2005/06 to 2016/17, the Gini coefficient and the log variance of per adult equivalent real consumption reported an increase in rural inequality by 11.8% and 20.6%, respectively. Also, the various Generalised entropy and Atkinson indices reported a consistent rise in inequality within the ranges of 26-68% and 28-35%, respectively. These findings are consistent wih the reports by the Ghana Statistical Service which show a consistent increase in Ghana's rural inequality within the periods under consideration (GSS, 2008, 2014, 2018).

Table 6.2 The level of and change in consumption inequality for rural Ghana

Inequality measures	**2005/06**	**2016/17**	**Change (%) 2005/06-2016/17**
Gini coefficient	0.3741	0.4184	11.8
Log variance	0.6821	0.8225	20.6
Generalised entropy indices			
GE(-1)	0.2762	0.4613	67.1
GE(0)	0.2209	0.2974	34.6
GE(1)	0.2316	0.2924	26.2
GE(2)	0.3337	0.4226	26.7
Atkinson indices			
A(0.5)	0.1063	0.1361	28.0
A(1)	0.1982	0.2573	29.8
A(2)	0.3558	0.4799	34.9

Author's own computation from the GLSS5 and GLSS7

6.2.2 Sector of employment and income groups

Table 6.3 reveals varied employment activities among rural workers by their households' income status (using consumption quintile). Regardless of income status, the share of rural workers in agriculture has declined in favour of services and this holds for both main and secondary employment. This is consistent with the earlier results from the overview chapter (see Figure 2.1). Regarding the main employment activities, a higher proportion of workers in low income households than upper income households engage in agricultural work while a larger fraction of workers from the upper income households than the low income households participates more in the industry and services sectors. As an example, in 2016/17, around 84% of workers from the poorest households had their main employment in the agricultural sector compared to their counterparts from the richest households which reported just around one third (36.7%) of the same employment category.

Regarding secondary employment, over 40% of workers from the less poor up to the richest households participates or holds secondary jobs in the agriculture sector. However, between the periods of 2005 and 2017, the proportion of workers from the poorest up to the middle-income households reported an increase in secondary agricultural employment while their counterparts from the richest households reported a decrease within the same period. A higher proportion of workers from the richest households (about 41%) hold secondary jobs in services than their counterparts from other income groups.

Table 6.3 Main and secondary employment activities of rural workers, by sector and consumption quintile (%)

	Main activity				Secondary activity			
	Agric.	Industry	Services	Total	Agric.	Industry	Services	Total
Quintile				2005/06				
Poorest	85.5	7.4	7.2	100	35.4	40.0	24.6	100
Less poor	81.7	8.5	9.8	100	42.3	27.5	30.2	100
Middle	74.5	10.6	14.9	100	48.3	23.3	28.4	100
Richer	65.4	12.8	21.8	100	50.2	18.0	31.8	100
Richest	58.5	12.9	28.7	100	55.8	13.2	31.0	100
				2016/17				
Poorest	83.9	5.3	10.8	100	47.6	24.3	28.1	100
Less poor	74.4	7.9	17.8	100	46.7	18.6	34.7	100
Middle	63.0	9.6	27.5	100	45.0	20.4	34.6	100
Richer	51.3	13.0	35.7	100	49.1	17.5	33.4	100
Richest	36.7	16.0	47.3	100	42.1	16.8	41.1	100

Source: Author's own computation from GLSS5 and 7

6.3 Estimation results and discussion

The above descriptive statistics has shown that between 2005 and 2017, the country's rural economy was charactarised by a higher and consistent rise in inequality (Table 6.2). Within this same period, the rural economy reported some appreciable changes in its employment trends in the agriculrural, services and industry secotors and across the sectors (see chapters two and five). Based on this observation, this chapter presents the estimates for the contributions of employment diversification and other factors to Ghana's rural inequality for the period under consideration, 2005-2017. The analysis is first presented for the contributions of factors to the level of total rural inequality in each period followed by the contributions of the same factors to the change in inequality between the two periods. For comparism, the estimates are provided for two different models. Model 1 takes into account both main and secondary employment activities engaged by rural workers while Model 2 focuses just on main employment activities. Previous studies have largely focused on just main activities and may, therefore, underestimate or overestimate the true potential effect of diversification on inequality. The importance of accounting for secondary employment activities is supported by the descriptive statistics in chapter five (see Table 5.2) and Table 6.3 above. For convenience and clarity, the estimates are first and foremost provided for aggregated factors before presenting the detailed estimates for individual or disaggregated factors. The findings below provide some plausible answers to the study's research question: How does employment diversification within and across the three major sectors influence the level of rural inequality and its change over the years?

6.3.1 Factor contribution to the level of rural inequality

Following the methodology, Tables 6.4 and 6.5 present estimates for factor contribution to: (1) the level of total rural inequality (represented by column s_j**);** and (2) the explained component of the level of rural inequality (represented by column P_j). Estimates for aggregate and individual factors are presented in Tables 6.4 and 6.5, respectively. For each survey year, the results indicate that approximately half (50%) of the level of total rural inequality is accounted for by observable explanatory variables or factors. In particular, estimates from Model 1 (which accounts for both main and secondary activities) attributed around 49.7 % and 51.7% of total level inequality to observable explanatory factors in 2005/06 and 2016/17 respectively whereas in Model 2 (which account for just main activities), the observable explanatory factors contributed to explaining around 49.4% and 51.1% respectively in 2005/06 and 2016/17. These estimates make it more imperative to examine how these observable (aggregate and individual) factors independently determine rural inequality. The discussion below thus provide some reasonable answers to the effect of employment diversification on the level of rural inequality.

The summarised results (from Table 6.4) suggest that of all aggregate factors, only within diversification contributed to reducing the level of total rural inequality in both years with diversification across-groups (or sectors) and control factors (family and geographical variables) contributing to increasing the level of total rural inequality. The results show that the contributions of within and across diversification to the level of inequality increased between 2005/06 and 2016/17. More specifically, the results from Model 1 indicate that within diversification contributed to decreasing the level of total inequality by 18.3% and 26.4% respectively in 2005/06 and 2016/17 whereas across diversification increased it by 20.4% and

34.8% respectively in 2005/06 and 2016/17. On the other hand, Model 2 shows that within diversification contributed to decreasing the level of total inequality by 11.4% and 17.7% respectively in 2005/06 and 2016/17 whereas across diversification contributed positively by 14.3 % and 23.4% respectively in 2005/06 and 2016/17. These estimates further confirm the importance of considering both main and secondary employment. Clearly, ignoring secondary economic activities or job holdings (as in Model 2) can potentially understate the true independent effects of within and across diversification on rural inequality.

Table 6.4 Aggregate factor contribution to level inequality (%)

	Model 1 (Main and secondary activity)				**Model 2** (Main activity)			
	2005/06		2016/17		2005/06		2016/17	
Aggregate factors	s_j	P_j	s_j	P_j	s_j	P_j	s_j	P_j
Within diversification	-18.3	-36.9	-26.4	-51.1	-11.4	-23.2	-17.7	-34.7
Across diversification	20.4	41.1	34.8	67.3	14.3	29.0	23.4	45.8
Family factors	24.4	49.1	23.6	45.6	27.7	56.1	23.9	46.8
Geography	23.2	46.7	19.8	38.2	18.8	38.1	21.5	42.2
Total								
Explained	49.7	100.0	51.7	100.0	49.4	100.0	51.1	100.0
Residual	50.3		48.3		50.6		48.9	

Source: Regression-based decomposition estimates using data from GLSS5 and GLSS7; s_j *and* P_j *are the relative contributions of factor j to the level of total inequality and its explained component respectively for each period.*

Though the net effect of total employment diversification (sum of the estimates for within and across diversification indices) on the level of total inequality is positive (in Models 1 and 2), its magnitude or percentage value is quite minimal compared to the controls and residual effect. The implication is that policy makers can attenuate the positive effect of across diversification by initiating policies that improve the welfare gains from diversification within-groups. However, for policy makers to be appropriately informed, a further analysis is required. Thus, we need to know the type of within-group diversification strategy that contributed more or less to the overall gains, as well as the type that reduced such gains. The estimates for individual or disaggregated factors (displayed in Table 6.5) corroborate varied contributions of diversification within each of the three sectors to the level rural inequality.

With the emergence of rural non-farm activities, some reasonable number of households now receive their livelihoods from both farm and non-farm employment than just one sector (Babatunde & Qaim, 2010; Senadza, 2011; GSS, 2014; Osarfo et al., 2016). In Ghana, some rural workers engage in non-farm activities as their primary and or secondary occupation (GSS, 2008, 2014). In recent times, many rural households in Ghana tend to receive a significant fraction of their income from non-farm employment (Senadza, 2011; GSS, 2014, 2018). The assertion that rural non-farm activities are more profitable and less vulnerable than the traditional (or agricultural) sector (Ackah, 2013; GSS, 2014, 2018) can largely push or pull many workers away from the latter to the former in order to improve their income sources and consumption patterns (Barrett et al., 2001; Démurger et al., 2010). The findings have shown that such diversification strategy across the farm (agriculture) and non-farm sectors (industry and services) generally contributes to worsening the level of rural income distribution.

Of all individual factors that contributed to reducing the level of total rural inequality (in Models 1 and 2), diversification within the agricultural sector reported the highest percentage values and this is mostly followed by diversification within the services sector (Table 6.5). The welfare gains from diversification within the agricultural and services sectors are higher for the recent year (2016/17) than a decade ago (2005/06). In both years, diversification within the industry sector somewhat contributed to increasing the level of rural inequality, apart from the survey year 2005/06 for Model 1 where it marginally reduced it.

Scharf and Rahut (2014) have claimed that while high skilled non-farm work increases inequality that of the low skilled reduces it. The study's results seem to be supported by this claim. In rural Ghana and elsewhere, most employment activities within agriculture (like field and tree crop farming) and services (primarily trading) often require low capital, little or no formal education and skills relative to activities within the industry sector (like manufacturing, construction, and mining) (GSS, 2014, 2018). The fact that diversification within the services sector contributes to reducing rural inequality over the years should interest policy makers. This statement is based on the fact that since 2006, the services sector has remained the largest contributor to Ghana's economic growth and has largely propelled the country to a lower middle-income status (GSS, 2014, 2018). Other studies have confirmed the importance of employment in the income distribution process (Fields, 2003; Gunatilaka & Chotikapanich, 2009; Senadza, 2011). Also, the findings on the positive net effect of total diversification on inequality are consistent with previous findings (Canagarajah et al, 2001; Kung & Lee, 2001) but contradict the claims of others (for instance, de Janvry & Sadoulet, 2001; Zhu & Luo, 2006).

Table 6.5 Individual factor contribution to level inequality (%)

	Model 1 (Main and secondary activity)				Model 2 (Main activity)			
	2005/06		2016/17		2005/06		2016/17	
Individual factors	s_j	P_j	s_j	P_j	s_j	P_j	s_j	P_j
Within Diversification								
Agriculture	-10.0	-20.1	-20.6	-39.8	-9.5	-19.2	-14.6	-28.5
Industry	-1.6	-3.2	1.4	2.8	0.5	1.0	0.5	1.0
Services	-6.8	-13.6	-7.3	-14.1	-2.5	-5.0	-3.7	-7.2
Across diversification	20.4	41.1	34.8	67.3	14.3	29.0	23.4	45.8
Family characteristics								
Education	6.1	12.2	8.7	16.8	4.2	8.6	8.6	16.8
Female	1.7	3.3	-0.1	-0.1	0.3	0.7	-0.3	-0.6
Age	0.7	1.4	0.0	0.1	0.3	0.6	-0.2	-0.4
Religion	-1.7	-3.5	2.8	5.4	-0.5	-0.9	3.3	6.5
Ethnicity	3.6	7.2	4.7	9.1	3.4	6.8	5.8	11.4
Marital status	-3.3	-6.7	-5.7	-11.0	-1.8	-3.7	-5.9	-11.5
Dependency ratio	2.0	4.0	1.4	2.8	1.2	2.4	1.4	2.8
Non-labour income	-1.4	-2.8	0.2	0.5	-0.7	-1.4	0.3	0.5
Household size	16.9	34.0	11.5	22.2	21.3	43.2	10.8	21.2
Geographical effect								
Ecological zone	0.6	1.3	2.8	5.3	-0.1	-0.1	3.4	6.6
Region	22.6	45.4	17.0	32.9	18.9	38.2	18.2	35.6
Total								
Explained	49.7	100.0	51.7	100.0	49.4	100.0	51.1	100.0
Residual	50.3		48.3		50.6		48.9	

Source: Regression-based decomposition estimates using data from GLSS5 and GLSS7; s_j *and* P_j *are the relative contributions of factor* j *to the level of total inequality and its explained component respectively for each period.*

Apart from employment diversification variables, some control factors exhibited clear effects on the level of total rural inequality. Marital status contributed to reducing the level of rural inequality in both years and Models with the effects being stronger in 2016/17. Though region, dependency ratio, household size and age increased the level of inequality, the effects are, however, lower in the most recent year (2016/17) than 2005/06. Some plausible reasons can be attributed to these findings. In Ghana, some regions-particularly, Northern, Upper East and Upper West-are noted to be relatively vulnerable with high incidence of poverty than other regions like Greater Accra and Ashanti. Therefore, the welfare gains from the region factor can be traced to the fact that over the past years, rural households in these vulnerable regions tend to receive some appreciable attention and supports from governments, non-government organisations (NGOs), international organisations and other agencies (GSS, 2014; Agyire-Tetteh et al., 2018).

The educational variable showed an increasing effect on the level of total inequality with the effects being stronger for the more recent year, 2016/17. This finding is consistent with Fields (2003), Gunatilaka and Chotikapanich (2009) and Scharf and Rahut (2014) who found education to be a major determinant of inequality. The gender variable contributed to increasing and decreasing the level of rural inequality in 2005/06 and 2016/17, respectively. This finding might be due to the much emphasis on women empowerment and gender parity by governments, international bodies and other stakeholders. Such feminist actions have somehow improved the well-being of female-headed households in recent years as compared to some decades ago. This assertion is supported by the GSS which reported of a higher consumption expenditure and lower poverty incidence among female-headed households than male-headed households (GSS, 2014,

2018). Non-labour income marginally improved rural income distribution in 2005/06 than 2016/17. Households receive non-labour income such as remittance, rental income (from land and farm equipment) and other sources like Livelihood Empowerment against Poverty (LEAP). The results suggest that these non-labour incomes somewhat benefited richer rural households than their poorer counterparts (see Senadza, 2011; GSS, 2014) in the most recent survey year, 2016/17. Ethnicity increased the level of inequality in both years and Models while the results are found to be mixed for religion and ecological zone, highlighting unclear effects of structural and circumstance variables for rural Ghana apart from ethnicity. Generally, structural and circumstance variables often influence the socio-economic decisions of agents (like individuals and households) which consequently affect welfare conditions within and across the structures.

6.3.2 Factor contribution to the change in rural inequality

While the previous discussion focused on the contribution of a factor to the level of rural inequality in 2005/06 and 2016/17, this sub-section, however, presents the results for a factor contribution to the change in inequality between the two periods. Though a factor might have contributed positively or negaitvely to the levels of total rural inequality (in both years and Models), it may not necessarily show a similar effect on the change in inequality. As pointed out in the descriptive statistics, all measures of inequality used show a consistent rise in rural inequality. However, following prior studies (see Fields, 2002, 2003, Liu, 2008; Gunatilaka & Chotikapanich, 2009), this study employs two measures of inequality, namely, Gini coefficient and log-variance for the analysis of change in inequality. Similar to the level analysis, Table 6.6 shows the summarised estimates for the aggregate factors while Table 6.7 displays the results for the individual or disaggregated factors. The analysis for both measures of inequality points to

similar directions in most cases, though with some expected differences in the magnitudes or percentage values (see a similar argument by Fields, 2002, 2003; Liu, 2008; Gunatilaka & Chotikapanich, 2009).

The summarised results show that within diversification consistently contributed to reducing the change in rural inequality while across diversification consistently worsened it over the years. To be more specific, within-group diversification accounted for reducing the change in Gini coefficient and log-variance by 94.9% and 65.8% respectively in Model 1, 70.9% and 48.3% respectively in Model 2. On the other hand, diversification across groups accounted for increasing the change in Gini coefficient and log-variance by 156.7% and 105.0% respectively in Model 1, 100.1% and 67.5% respectively in Model 2. The net effect of diversification on the change in rural inequality is positive and this is due to the dominance of the positive effect of across diversification over the negative effect of within diversification. Geographical factors generally increased the change in inequality, apart from Model 1 where it decreased the change in Gini coefficient by 9.0%. Combined family factors increased the change in inequality in Model 1, but mixed for Model 2. Thus, familiy factors increased the change in Gini coefficient and log-variance by 16.7% and 19.6% respectively in Model 1, while in Model 2, it decreased the change in Gini coefficient by 8.5% but increased the change in log-vriaance by 5.3% in Model 2.

Table 6.6 Aggregate factor contribution to change in inequality (%)

	Model 1 (Main and secondary activity)		**Model 2** (Main activity)	
	2005/06-2016/17		2005/06-2016/17	
Aggregate factors	$\Pi_j(Gini)$	$\Pi_j(\sigma^2(\ln Y))$	$\Pi_j(Gini)$	$\Pi_j(\sigma^2(\ln Y))$
Within groups diversification	-94.9	-65.8	-70.9	-48.3
Across groups diversification	156.7	105.0	100.1	67.5
Family characteristics	16.7	19.6	-8.5	5.3
Geographical effect	-9.0	3.0	44.6	34.9
Residual	30.7	38.2	34.7	40.7
Total	100.0	100.0	100.0	100.0
Change in inequality	11.8	20.6	11.8	20.6

Source: Regression-based decomposition estimates using data from GLSS5 and GLSS7; $\Pi_j(Gini)$ *and* $\Pi_j(\sigma^2(\ln Y))$ *are the relative contributions of factor j to the change in inequality between the two periods using the measures of Gini coefficient and log variance, respectively.*

Similar to the level analysis, the discussion now focuses on the explicit contribution of each individual or disaggregated factor to the change in rural inequality between 2005/06 and 2016/17 (see Table 6.7). The findings presented here provide plausible answers to the influence of employment diversification on the change in Ghana's rural inequality. Very noticeably, diversification within the agricultural sector contributed considerably to reducing the change in Gini coefficient and log-variance by 110.5% and 72.3% respectively in Model 1, 57.8% and 39.4% respectively in Model 2. Compared to other individual factors, diversification within the agricultural sector contributed most to the reduction in the change in rural inequality, particularly for Model 1. Diversification within the services sector contributed to decreasing the change in Gini coefficient and log-variance by 11.6% and 9.8% in Model 1, 14.0% and 9.6% respectively in Model 2. Diversification within the industry sector consistently increased the change in rural inequality; the effects are much stronger in Model 1. Of all the explanatory variables that

contributed to increasing the change in rural inequality, the results revealed diversification across sectors to be the most important factor. On the average, employment diversification (based on the total net effect) contributed positively to the rise (or change) in Ghana' rural inequality between 2005/06 and 2016/17.

Apart from considering employment diversification, the findings indicate that other factors including gender, age, marrital status and household size consistently contributed to lowering the change in inequality in Models 1 and 2. Dependency ratio and region contributed to reducing the change in inequality in Model 1. Education, religion, ethnicity, non-labour income and ecological zone exerted a consistent positive effect on the change in rural inequality in both Models; the effects are stronger for education, religion and ecological zone.

Other studies have employed similar estimation technique to examine the role of socio-economic factors to a change in inequality (Fields, 2003; Liu, 2008; Gunatilaka & Chotikapanich, 2009; Brewer & Wren-Lewis, 2016). For example, Fields (2003) indicated that of all the explanatory factors, only education contributed much to explaining the change in inequality with employment having just a minimal effect in the United States. On the other hand, Gunatilaka and Chotikapanich (2009) found three explanatory factors-namely, infrastructure, education and occupation (or employent)-to be the key contributors to the change in inequality in Sri Lanka.

Table 6.7 Individual factor contribution to change in inequality (%)

	Model 1 (Main and secondary activity) 2005/06-2016/17		Model 2 (Main activity) 2005/06-2016/17	
Individual factors	$\Pi_j(Gini)$	$\Pi_j(\sigma^2(\ln Y))$	$\Pi_j(Gini)$	$\Pi_j(\sigma^2(\ln Y))$
Entropy Index				
Within Agric.	-110.5	-72.3	-57.8	-39.4
Within Industry	27.2	16.3	0.8	0.7
Within Services	-11.6	-9.8	-14.0	-9.6
Across groups	156.7	105.0	100.1	67.5
Family characteristics				
Education	30.8	21.4	45.2	29.6
Female	-14.5	-8.4	-5.5	-3.3
Age	-5.5	-3.2	-4.5	-2.7
Religion	40.8	24.7	35.5	21.8
Ethnicity	14.4	10.3	26.6	17.8
Marital status	-25.8	-17.2	-39.9	-25.4
Dependency ratio	-3.3	-1.3	3.6	2.7
Non-labour income	14.1	8.2	8.2	4.9
Household size	-34.5	-15.0	-77.6	-40.1
Geographical effect				
Ecological zone	20.8	13.1	32.2	20.0
Region	-30.0	-10.1	12.4	14.9
Residual	30.7	38.2	34.7	40.7
Total	100.0	100.0	100.0	100.0
Change in inequality	11.8	20.6	11.8	20.6

Source: Regression-based decomposition estimates using data from GLSS5 and GLSS7; $\Pi_j(Gini)$ *and* $\Pi_j(\sigma^2(\ln Y))$ *are the relative contributions of factor j to the change in inequality between the two periods using the measures of Gini coefficient and log variance, respectively.*

6.4 Chapter summary

This chapter sought to examine the role of employment diversification in explaining Ghana's rural inequality between the years 2005/06 and 2016/17. It contributed to the debate on the inequality effect of diversification by relying on an improved measure of diversification and a regression-based decomposition technique. Regarding the contributions of factors to the level of total rural inequality, the study found the effects of within and across diversification to be negative and positive, respectively. More specifically, employment diversification within the agricultural and services sectors contributed to reducing the level of rural inequality, with the effects being much stronger for the former than the latter. On the other hand, diversification within the industry sector worsened the level of rural inequality in most cases, though marginally. These findings were attributed to the generally less entry barriers in the agricultural and services sectors relative to the industry sector (like manufacturing, construction and mining sub-sectors) which seem to be characterised by a higher entry barriers including human and financial capital endowment; such barriers seem to benefit richer households than their poorer counterparts. Further, the study established negative and positive effects of within and across diversification on the change in rural inequality between 2005/06 and 2016/17. Comparatively, diversification within the agricultural sector contributed most to reducing the change in rural inequality. Also, diversification within services decreased the change in rural inequality while diversification within the industry sector consistently increased the change (or rise) in Ghana's rural inequality. The net effect of employment diversification on the level of and change in rural inequality is shown to be positive. Apart from the employment diversification variables, the results revealed the influence of other key factors such as education, religion, ethnicity, region, gender and non-labour income on Ghana's rural inequality. For instance, while gender, marrital

status and household size decreased the change in rural inequality between 2005/06 and 2016/17, education, religion, ethnicity and ecological zone rather worsened it.

Based on these findings, policy makers should aim at improving the employment opportunities in the agricultural sector in order to strengthen its role towards a much reduction in rural inequality. For instance, the government should promote the recently launched Ghana Commodity Exchange (GCX) market to benefit rural farmers in order to minimise some challenges such as price instability and poor market for farm produce. Further, encouraging farmers to complement their farming activities with services could further improve rural income distribution. Poorer households should be empowered and supported to take advantage of the gains from the services sector. Government's policy on gender empowerment and family planning should be strengthened. Rural households are encouraged to take advantage of the on-going educational programmes in the country, for instance, the recent free senior high school policy.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

7.0 Introduction

This chapter concludes the entire study with some policy recommendations and areas for further research. The thesis sought out to broadly examine the role of employment in explaining welfare differences among individuals and their households in Ghana. Based on this broad objective, three analyses in chapters four, five and six were carried out to analyse three specific objectives and corresponding research questions. The first analysis relied on data from the latest round of the Ghana Living Standards Survey in 2016/17 (GLSS7) to analyse the influence of employment status in explaining rural and urban household consumption welfare. Relying on unconditional quantile regression and decomposition approaches, the analysis contributed to the existing literature by examining the effects of different groups of employment status on the consumption welfare of households. On the other hand, the second analysis relied on datasets from the fifth and seventh rounds of the Ghana Living Standards Survey in 2005/06 and 2016/17 (GLSS5 and GLSS7, respectively) to analyse the degree and determinants of employment diversification among rural households in Ghana. Using the entropy index of diversification and a sample selection model, the analysis contributed to the literature by examining the degree and determinants of employment diversification within and across the three major sectors: agricultural, services and industry. The third analysis also employed the same datasets used for the second analysis in chapter 5 (thus, GLSS5 and GLSS7) to analyse the role of employment

diversification in explaining the level of and change in Ghana's rural inequality over the years. Using the entropy index of employment diversification (in chapter 5) and a regression-based decomposition technique, the analysis contributed to the on-going debate on the effect of diversification on rural inequality.

7.1 Summary of key findings

7.1.1 Employment status and household consumption welfare

The results showed that different groups of employment status contribute differently across the quantiles of the consumption distributions for rural and urban households. Regardless of location, the study found a generally higher return to non-farm self-employed with employees (employers) than all other groups of workers: including employers and self-employed without employees (own-account) in the agricultural sector, own-account in the non-farm sector and formal and informal employees. The effects of non-farm employers were significant across all quantiles for urban households and some quantiles for rural households. Comparing non-farm own-account and formal employees, the former contributed to improving household welfare at the lower quantiles while the latter improved it at the more upper quantiles. Returns to non-farm own-account were found to be generally higher than agricultural own-account. Relative to non-farm own-account, the study found lower returns to informal paid employees, unpaid workers, inactive and unemployed. Across all quantiles, urban households were significantly found with higher consumption welfare than their rural counterparts. These inequality gaps were stronger among poorer than richer households. In the same line, the study found the rural-urban inequality gaps to be largely due to the differences in the returns to observable characteristics than just the differences in the characteristics themselves. Of all the observable factors that were considered for the analysis, the study found employment, education and household size to be the most

important variables in explaining the observed rural-urban consumption inequality gaps in Ghana.

7.1.2 Degree of employment diversification and its determinants

Results from the entropy index revealed a greater degree of employment diversification within the agricultural sector and this was followed by the services and industry sectors, respectively. The results also reported of a general increase in employment diversification over the period under consideration, 2005-2017. Further, the study established that factors such as gender, marital status, age, education, landholdings, location, seasonal migration and infrastructural indicators like road, electricity, market and credit institutions remain key determinants of the observed employment diversification among rural households in Ghana. However, these factors largely reported dissimilar influence on employment diversification within and across the three sectors. For instance, being a female-head relative to being a male-head lowered employment diversification within the agricultural sector but increased diversification within the non-farm sectors (services and industry). In the same line, infrastructural development in rural communities largely favoured a higher degree of employment diversification in the non-farm sectors as compared to the traditional or agricultural sector. Another key finding was that education significantly decreased households' diversification within the agricultural sector but increased that of the non-farm sectors.

7.1.3 Employment diversification and inequality in rural Ghana

The study found varied contributions of different components of employment diversification to Ghana's rural consumption inequality. Diversification within the agricultural and services sectors contributed consistently to reducing the levels of and change in rural inequality for the periods 2005/06 and 2016/17. A stimulating finding from the study was that diversification within the agricultural sector contributed considerably to reducing the level of rural inequality than all other factors including diversification within the services sector. However, diversification within the industry sector contributed to increasing the change in rural inequality within the same period under consideration. The influence of diversification on inequality was much higher for combining main and secondary employment activities than just focusing on households' main employment activities. The sum effect of within diversification for the three sectors was found to be inequality-reducing, both at the level of and change in rural inequality. However, in all cases, diversification across the sectors was found to be inequality-increasing, with the effect being stronger than the sum effect of within diversification. As a result, the net effect of employment diversification was shown to be inequality-increasing. Other factors including education, religion, ethnicity, gender, region and non-labour income also contributed to explaining the observed patterns of Ghana's rural inequality.

7.2 Some policy implications of the study's findings

The study's empirical findings provide some guidelines for specific policies. The evidence from the study that non-farm employers contribute more to household welfare than other groups of workers calls for reforms in the informal sector. To sustain and further enhance the welfare gains of non-farm employers, the government through its relevant institutions such as the Registrar General's Department, the National Board for Small Scale Industries (NBSSI), the Ministry of

Trade and Industry, the Ministry of Employment and Labour Relations and the Ministry of Business Development should expedite a nation-wide formalisation of the informal sector with emphasis on business registration, record keepings, customer service, innovation and basic management, among others. These actions are expected to improve and expand businesses owned by non-farm employers with the potential of generating employment and earnings opportunities for the unemployed, the unpaid worker, and the inactive, as well as other vulnerable workers including the agricultural own-account. For this to be successful, NBSSI and the Ministry of Trade and Industry should, among others, collaborate with the Agricultural Development Bank (ADB) and the Ghana EXIM Bank to provide the non-farm employers with flexible repayment of long-term credit facility. These incentives should also favour the non-farm own-account to graduate to the status of employers so as to reinforce their welfare gains.

Again, it is recommended that for rural households to experience a greater degree of employment diversification in the non-farm sectors, the government through its relevant institutions including the Electricity Company of Ghana, the Ghana Water Company, the Ministry of Roads, Highways and Transport, the Ministry of Trade and Industry, the Bank of Ghana and the National Development Planning Commission should prioritise infrastructural development across the rural communities. Attention should be geared towards the expansion or development of market centres, electricity, roads, portable water systems and financial institutions (such as banks and micro-finance) in the rural areas. These attempts can minimise the part of the rural-urban inequality gap that is primarily due to differences in the returns to observable characteristics. Another policy direction is that government should aim at capitalising on the inequality-reducing effect of employment diversification within the services sector in rural Ghana. Key government

institutions including the Ministry of Business Development, the Ministry of Trade and Industry, and the NBSSI should encourage, train and support rural farmers to complement their farming activities with wholesale and retail trading, and other forms of services. Services that demand less human and start-up capital should be promoted, particularly among households that engage in subsistence farming.

Furthermore, the observed negative linkage between employment diversification in the agricultural sector and human capital should be properly addressed through a specific policy intervention and public re-orientation. By encouraging educated persons into the agricultural sector, the country can minimise the socio-economic cost of the large numbers of unemployed secondary school leavers and tertiary graduates. In order to attract a good number of these leavers and graduates into the agricultural sector, the government, through its key stakeholders including the Ministry of Food and Agriculture, the Ministry of Business Development, the Ministry of Trade and Industry, the NBSSI, the ADB and the Ghana EXIM Bank, should aim at providing different forms of assistance such training, storage and credit facilities, and ready market in the sector. Such initiatives can improve the productivity of and returns to the agricultural sector and consequently minimise the present rural-urban consumption inequality gaps. By promoting a higher diversification in agricultural employment, the country stands a better chance of fighting against the rising rural inequality. Relatedly, government's current initiatives on planting for food and jobs, rearing for food and jobs, one-village-one-dam and one-district-one-factory should, through the Ministry of Special Development Initiative, be used to stimulate employment opportunities across the rural areas, with a particular attention on the savannah belt of the country. These policy initiatives should also aim at motivating and benefiting the unpaid workers, the unemployed and the inactive.

7.3 Limitations of the study and suggestions for future studies

There are some limitations of the study that need to be pointed out. The study relied primarily on cross sectional datasets which cannot explicitly show the dynamics of employment and welfare outcomes of a household over a period of time. In general, estimates from cross sectional analysis are interpreted in terms of correlation rather than causality. The analysis on rural inequality effect of employment diversification somewhat minimised this challenge by relying on an estimation technique that analyses the changes in inequality between two cross sectional datasets or time periods. Nonetheless, future studies should consider analysing similar issues using a longitudinal data to address the limitations associated with cross sectional datasets.

Moreover, the study's results do not show how diversification within a more specific sub-sectors like perennial crops, non-perennial crops, animal production, mining, processing, construction, wholesale and retail trading activities might contribute differently to rural inequality. This is also a data limitation problem since some of these sub-sectors do not have enough observations of diverse economic activities. Added to this, the Ghana Statistical Service employed a revised ISIC code for the survey in 2016/17 to capture some specific and additional economic activities as compared to the survey in 2005/06. These challenges, among others, lower the flexibility of constructing appropriate diversification indices for more narrow sub-sectors of economic activities over the periods. This study, however, addressed these potential challenges by focusing on diversification within and across the three major sectors (agriculture, industry and services) which have remained unchanged over the years (GSS, 2008, 2014, 2018). Future studies can go beyond this broad classification to focus more on specific sub-sectors within these major sectors.

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APPENDIX

Table 4A1 Full sample estimates from OLS and UQR (using the employment status of all household members)

Variables	Mean	q10	q25	q50	q75	q90
Share of public employees	-0.0152	-0.1440***	-0.1184***	-0.0857**	0.0206	0.2443**
	(0.0383)	(0.0460)	(0.0406)	(0.0436)	(0.0706)	(0.1120)
Share of private formal employees	-0.0546**	-0.2353***	-0.2209***	-0.1017***	0.0522	0.1472*
	(0.0272)	(0.0430)	(0.0358)	(0.0352)	(0.0534)	(0.0834)
Share of informal paid employees	-0.2744***	-0.3193***	-0.2648***	-0.2391***	-0.1824***	-0.2633***
	(0.0363)	(0.0632)	(0.0471)	(0.0474)	(0.0583)	(0.0780)
Share of non-farm employers	0.3075***	-0.0624	0.0346	0.2197***	0.5092***	0.7537***
	(0.0482)	(0.0573)	(0.0552)	(0.0627)	(0.0826)	(0.1403)
Share of agricultural employers	-0.0164	-0.1328	-0.0814	-0.2190*	-0.0724	0.2743
	(0.0980)	(0.2210)	(0.1444)	(0.1243)	(0.1364)	(0.2057)
Share of agricultural own-account	-0.3945***	-0.4626***	-0.5475***	-0.4476***	-0.3603***	-0.2831***
	(0.0239)	(0.0617)	(0.0442)	(0.0369)	(0.0397)	(0.0485)
Share of unpaid workers	-0.3191***	-0.5906***	-0.4677***	-0.3274***	-0.2429***	-0.1730***
	(0.0260)	(0.0733)	(0.0470)	(0.0362)	(0.0400)	(0.0545)
Share of unemployed	-0.3939***	-0.1911**	-0.2138***	-0.5167***	-0.5541***	-0.4633***
	(0.0513)	(0.0750)	(0.0692)	(0.0789)	(0.0928)	(0.1260)
Share of inactive	-0.3210***	-0.4681***	-0.3818***	-0.3328***	-0.2471***	-0.1577***
	(0.0263)	(0.0602)	(0.0414)	(0.0371)	(0.0430)	(0.0596)
Female head	0.0501***	0.0740**	-0.0023	0.0135	0.1033***	0.1180***
	(0.0148)	(0.0323)	(0.0241)	(0.0218)	(0.0255)	(0.0344)
Age of head	0.0130***	0.0050	0.0112***	0.0102***	0.0182***	0.0143***
	(0.0022)	(0.0067)	(0.0039)	(0.0031)	(0.0035)	(0.0043)
Square of age of head/100	-0.0126***	-0.0058	-0.0114***	-0.0105***	-0.0165***	-0.0119***
	(0.0022)	(0.0067)	(0.0037)	(0.0030)	(0.0033)	(0.0040)
Share of basic education	0.3392***	0.6159***	0.5028***	0.3896***	0.1938***	0.0073
	(0.0165)	(0.0416)	(0.0302)	(0.0294)	(0.0313)	(0.0363)
Share of secondary education	0.5018***	0.5607***	0.5653***	0.5492***	0.4656***	0.3024***
	(0.0221)	(0.0451)	(0.0368)	(0.0381)	(0.0446)	(0.0577)

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A1 Continued: Full sample estimates from OLS and UQR (using the employment status of all household members)

Variables	Mean	q10	q25	q50	q75	q90
Share of tertiary education	0.7110***	0.3802***	0.4450***	0.6664***	0.9250***	0.9351***
	(0.0282)	(0.0425)	(0.0357)	(0.0411)	(0.0638)	(0.0899)
Christian	0.1723***	0.3800***	0.2990***	0.1188***	0.0363*	0.0320
	(0.0189)	(0.0602)	(0.0346)	(0.0238)	(0.0214)	(0.0235)
Muslim	0.1717***	0.4939***	0.2958***	0.0401	-0.0372	-0.0137
	(0.0206)	(0.0707)	(0.0390)	(0.0269)	(0.0235)	(0.0244)
Married	-0.0978***	-0.0670	-0.0636**	-0.0994***	-0.1644***	-0.1331***
	(0.0175)	(0.0429)	(0.0287)	(0.0253)	(0.0264)	(0.0356)
Divorced/widowed	-0.0988***	-0.2705***	-0.2157***	-0.1448***	0.0987**	0.0764
	(0.0222)	(0.0423)	(0.0287)	(0.0270)	(0.0391)	(0.0555)
Akan (major ethnic group)	0.2487***	0.4494***	0.3929***	0.2589***	0.1139***	0.0353
	(0.0113)	(0.0293)	(0.0226)	(0.0182)	(0.0193)	(0.0247)
Dependency ratio	-0.0455***	-0.0873***	-0.0478***	-0.0403***	-0.0432***	-0.0593***
	(0.0078)	(0.0250)	(0.0138)	(0.0108)	(0.0107)	(0.0115)
Household receives remittances	0.0884***	0.2474***	0.1173***	0.0459***	0.0025	0.0182
	(0.0113)	(0.0307)	(0.0216)	(0.0168)	(0.0167)	(0.0218)
Household receives rent income	0.0684	0.2021	0.2485*	0.0267	-0.0598	-0.0525
	(0.0648)	(0.1876)	(0.1317)	(0.0865)	(0.0674)	(0.0531)
Household size	-0.1959***	-0.1218***	-0.1808***	-0.2300***	-0.2322***	-0.2001***
	(0.0088)	(0.0203)	(0.0121)	(0.0113)	(0.0142)	(0.0145)
Square of household size	0.0074***	0.0010	0.0052***	0.0091***	0.0108***	0.0100***
	(0.0006)	(0.0015)	(0.0007)	(0.0007)	(0.0009)	(0.0009)
Urban location	0.3868***	0.4404***	0.4856***	0.4690***	0.3271***	0.2176***
	(0.0123)	(0.0315)	(0.0272)	(0.0227)	(0.0227)	(0.0274)
Constant	8.0009***	6.6313***	7.3504***	8.2914***	8.7154***	9.2354***
	(0.0582)	(0.1602)	(0.0989)	(0.0830)	(0.0910)	(0.1109)
Observations	13,898	13,898	13,898	13,898	13,898	13,898
R-squared	0.5190	0.1766	0.3329	0.4024	0.3191	0.1853

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A2 Rural sample estimates from OLS and UQR (using the employment status of all household members)

Variables	Mean	q10	q25	q50	q75	q90
Share of public employees	-0.0031	-0.2076***	-0.2127***	-0.1180	-0.0233	0.4199*
	(0.0678)	(0.0671)	(0.0733)	(0.0798)	(0.1070)	(0.2348)
Share of private formal employees	-0.0717	-0.2601***	-0.2409***	-0.2117***	0.0269	0.3337**
	(0.0472)	(0.0703)	(0.0541)	(0.0643)	(0.0846)	(0.1515)
Share of informal paid employees	-0.3973***	-0.5928***	-0.4694***	-0.3880***	-0.2446***	0.0530
	(0.0609)	(0.1128)	(0.0790)	(0.0785)	(0.0878)	(0.1622)
Share of non-farm employers	0.2561***	0.0865	0.0755	0.2560**	0.1553	0.5979*
	(0.0989)	(0.0971)	(0.0955)	(0.1184)	(0.1700)	(0.3156)
Share of agricultural employers	-0.1445	-0.2329	-0.2523*	-0.0376	-0.2524	-0.0670
	(0.1278)	(0.2216)	(0.1492)	(0.1897)	(0.1924)	(0.2919)
Share of agricultural own-account	-0.3961***	-0.3212***	-0.4328***	-0.4673***	-0.4158***	-0.3618***
	(0.0316)	(0.0573)	(0.0478)	(0.0497)	(0.0542)	(0.0843)
Share of unpaid workers	-0.3828***	-0.4444***	-0.4393***	-0.4387***	-0.4178***	-0.3014***
	(0.0380)	(0.0829)	(0.0605)	(0.0548)	(0.0569)	(0.0884)
Share of unemployed	-0.2807***	-0.2191	-0.1351	-0.2299	-0.6357***	-0.3673
	(0.1077)	(0.1536)	(0.1348)	(0.1430)	(0.1808)	(0.2830)
Share of inactive	-0.4557***	-0.5703***	-0.5216***	-0.4837***	-0.3979***	-0.2404**
	(0.0421)	(0.0895)	(0.0609)	(0.0575)	(0.0622)	(0.0980)
Female head	0.0149	-0.0027	0.0144	-0.0296	0.0244	0.1024**
	(0.0216)	(0.0432)	(0.0314)	(0.0299)	(0.0342)	(0.0505)
Age of head	0.0125***	-0.0003	0.0065	0.0145***	0.0164***	0.0322***
	(0.0033)	(0.0064)	(0.0047)	(0.0043)	(0.0044)	(0.0060)
Square of age of head/100	-0.0130***	-0.0018	-0.0074	-0.0147***	-0.0166***	-0.0308***
	(0.0031)	(0.0064)	(0.0046)	(0.0041)	(0.0041)	(0.0055)
Share of basic education	0.3494***	0.5091***	0.4500***	0.4212***	0.2288***	0.0555
	(0.0236)	(0.0465)	(0.0395)	(0.0388)	(0.0424)	(0.0613)
Share of secondary education	0.5580***	0.4724***	0.5772***	0.6546***	0.5302***	0.3535***
	(0.0433)	(0.0651)	(0.0583)	(0.0617)	(0.0758)	(0.1182)

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A2 Continued: Rural sample estimates from OLS and UQR (using the employment status of all household members)

Variables	Mean	q10	q25	q50	q75	q90
Share of tertiary education	0.7037***	0.3304***	0.3878***	0.6183***	0.8755***	1.3459***
	(0.0589)	(0.0652)	(0.0623)	(0.0701)	(0.0978)	(0.1991)
Christian	0.1519***	0.2570***	0.2141***	0.1596***	0.0546*	0.0485
	(0.0225)	(0.0599)	(0.0389)	(0.0308)	(0.0281)	(0.0349)
Muslim	0.1793***	0.3485***	0.2085***	0.1136***	0.0623**	0.0813**
	(0.0274)	(0.0732)	(0.0469)	(0.0365)	(0.0276)	(0.0375)
Married	-0.0892***	-0.0144	-0.0646*	-0.0610*	-0.1368***	-0.2263***
	(0.0246)	(0.0525)	(0.0353)	(0.0340)	(0.0366)	(0.0561)
Divorced/widowed	-0.1015***	-0.1620***	-0.2121***	-0.0886**	-0.0524	0.1494
	(0.0351)	(0.0563)	(0.0450)	(0.0417)	(0.0524)	(0.0970)
Akan (major ethnic group)	0.4051***	0.3804***	0.4126***	0.5006***	0.3865***	0.2772***
	(0.0172)	(0.0371)	(0.0300)	(0.0309)	(0.0294)	(0.0393)
Dependency ratio	-0.0455***	-0.0617***	-0.0390**	-0.0265*	-0.0426***	-0.0571***
	(0.0115)	(0.0231)	(0.0173)	(0.0137)	(0.0132)	(0.0171)
Household receives remittances	0.1566***	0.2951***	0.1843***	0.1054***	0.0571**	0.1028***
	(0.0155)	(0.0408)	(0.0269)	(0.0217)	(0.0224)	(0.0322)
Household receives rent income	0.0790	0.0778	0.2730**	-0.0088	0.0682	-0.1730**
	(0.0665)	(0.1518)	(0.1093)	(0.1094)	(0.1000)	(0.0854)
Household size	-0.1944***	-0.0832***	-0.1569***	-0.2124***	-0.2396***	-0.2712***
	(0.0107)	(0.0203)	(0.0147)	(0.0140)	(0.0172)	(0.0240)
Square of household size	0.0072***	0.0008	0.0045***	0.0077***	0.0103***	0.0124***
	(0.0007)	(0.0013)	(0.0008)	(0.0008)	(0.0010)	(0.0014)
Constant	8.0111***	6.8080***	7.4991***	8.0729***	8.7712***	8.8844***
	(0.0844)	(0.1631)	(0.1199)	(0.1108)	(0.1193)	(0.1742)
Observations	7,932	7,932	7,932	7,932	7,932	7,932
R-squared	0.4140	0.1104	0.2113	0.3113	0.2986	0.2125

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A3 Urban sample estimates from OLS and UQR (using the employment status of all household members)

Variables	Mean	q10	q25	q50	q75	q90
Share of public employees	-0.0040	-0.1358***	-0.1313***	-0.0664	0.1509**	0.2389**
	(0.0430)	(0.0479)	(0.0491)	(0.0482)	(0.0664)	(0.1122)
Share of private formal employees	-0.0277	-0.1140**	-0.1216***	-0.0869**	0.0202	0.1471*
	(0.0322)	(0.0457)	(0.0406)	(0.0404)	(0.0514)	(0.0809)
Share of informal paid employees	-0.1801***	-0.1437**	-0.1948***	-0.1748***	-0.2552***	-0.1813**
	(0.0365)	(0.0627)	(0.0547)	(0.0487)	(0.0559)	(0.0807)
Share of non-farm employers	0.3419***	0.1622***	0.2456***	0.2715***	0.3418***	0.6496***
	(0.0553)	(0.0603)	(0.0603)	(0.0606)	(0.0888)	(0.1565)
Share of agricultural employers	0.0633	-0.5603*	-0.3197*	-0.0666	0.1026	0.8777**
	(0.1602)	(0.2884)	(0.1879)	(0.1365)	(0.1976)	(0.3925)
Share of agricultural own-account	-0.5332***	-0.9006***	-0.6485***	-0.5186***	-0.4432***	-0.3063***
	(0.0450)	(0.1155)	(0.0745)	(0.0580)	(0.0583)	(0.0712)
Share of unpaid workers	-0.1889***	-0.2439***	-0.1770***	-0.1966***	-0.2432***	-0.2103***
	(0.0379)	(0.0760)	(0.0570)	(0.0480)	(0.0520)	(0.0715)
Share of unemployed	-0.3874***	-0.2797***	-0.4056***	-0.4469***	-0.4880***	-0.2889**
	(0.0527)	(0.1077)	(0.0816)	(0.0771)	(0.0830)	(0.1231)
Share of inactive	-0.1987***	-0.2228***	-0.2484***	-0.2259***	-0.1538***	-0.1860***
	(0.0336)	(0.0625)	(0.0484)	(0.0428)	(0.0479)	(0.0654)
Female head	0.0730***	-0.0376	0.0151	0.0568**	0.1470***	0.1580***
	(0.0201)	(0.0332)	(0.0285)	(0.0245)	(0.0302)	(0.0457)
Age of head	0.0130***	0.0193***	0.0031	0.0107***	0.0118**	0.0200***
	(0.0033)	(0.0064)	(0.0047)	(0.0042)	(0.0050)	(0.0068)
Square of age of head/100	-0.0111***	-0.0198***	-0.0027	-0.0090**	-0.0089*	-0.0165**
	(0.0033)	(0.0065)	(0.0047)	(0.0041)	(0.0049)	(0.0065)
Share of basic education	0.2678***	0.4558***	0.3963***	0.2791***	0.1714***	0.0623
	(0.0223)	(0.0527)	(0.0383)	(0.0332)	(0.0363)	(0.0472)
Share of secondary education	0.4232***	0.5935***	0.4691***	0.4240***	0.3183***	0.2350***
	(0.0283)	(0.0570)	(0.0451)	(0.0420)	(0.0437)	(0.0611)

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A3 Continued: Urban sample estimates from OLS and UQR (using the employment status of all household members)

Variables	Mean	q10	q25	q50	q75	q90
Share of tertiary education	0.6596***	0.5535***	0.5842***	0.6261***	0.6201***	0.7243***
	(0.0310)	(0.0496)	(0.0476)	(0.0442)	(0.0583)	(0.0881)
Christian	0.1291***	0.2446***	0.1600***	0.0970**	0.0384	0.0649
	(0.0304)	(0.0803)	(0.0520)	(0.0392)	(0.0397)	(0.0483)
Muslim	0.0336	0.1548*	0.0029	-0.0189	-0.0255	-0.0210
	(0.0326)	(0.0853)	(0.0521)	(0.0397)	(0.0413)	(0.0516)
Married	-0.1119***	-0.0545	-0.0986***	-0.1027***	-0.1035***	-0.1317***
	(0.0221)	(0.0429)	(0.0357)	(0.0302)	(0.0357)	(0.0485)
Divorced/widowed	-0.0886***	-0.1650***	-0.1551***	-0.0288	-0.0086	-0.0522
	(0.0268)	(0.0432)	(0.0350)	(0.0344)	(0.0417)	(0.0647)
Akan (major ethnic group)	0.0599***	0.1686***	0.0917***	0.0377*	-0.0055	-0.0200
	(0.0165)	(0.0327)	(0.0227)	(0.0212)	(0.0249)	(0.0350)
Dependency ratio	-0.0324***	0.0187	-0.0301*	-0.0274**	-0.0716***	-0.0508***
	(0.0109)	(0.0249)	(0.0172)	(0.0134)	(0.0152)	(0.0190)
Household receives remittances	-0.0071	0.0589*	0.0116	-0.0394**	-0.0125	0.0055
	(0.0164)	(0.0319)	(0.0245)	(0.0198)	(0.0234)	(0.0320)
Household receives rent income	-0.0631	0.2660	-0.0606	-0.1744	-0.1324	-0.2697**
	(0.1191)	(0.3456)	(0.2806)	(0.1980)	(0.1829)	(0.1086)
Household size	-0.2209***	-0.1718***	-0.1918***	-0.2286***	-0.2424***	-0.2435***
	(0.0119)	(0.0270)	(0.0183)	(0.0159)	(0.0181)	(0.0253)
Square of household size	0.0103***	0.0043*	0.0056***	0.0113***	0.0141***	0.0148***
	(0.0010)	(0.0023)	(0.0014)	(0.0012)	(0.0014)	(0.0018)
Constant	8.5546***	7.3425***	8.3356***	8.6831***	9.1534***	9.3224***
	(0.0841)	(0.1793)	(0.1251)	(0.1101)	(0.1263)	(0.1765)
Observations	5,966	5,966	5,966	5,966	5,966	5,966
R-squared	0.3795	0.1567	0.2375	0.2661	0.2227	0.1380

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A4 Decomposition results from OBD and UQD (using the employment status of all household members)

	Mean		q10		q25	
Variables	**Explained**	**Unexplained**	**Explained**	**Unexplained**	**Explained**	**Unexplained**
Share of public employees	-0.0002	-0.0000	-0.0002**	0.0000	-0.0003***	0.0001
	(0.0019)	(0.0023)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Share of private formal employees	-0.0024	0.0021	-0.0003**	0.0002	-0.0006***	0.0002
	(0.0026)	(0.0025)	(0.0001)	(0.0001)	(0.0002)	(0.0002)
Share of informal paid employees	-0.0053***	0.0097***	-0.0001**	0.0006***	-0.0003***	0.0006***
	(0.0012)	(0.0033)	(0.0001)	(0.0002)	(0.0001)	(0.0002)
Share of non-farm employers	0.0089***	0.0008	0.0001***	0.0000	0.0004***	0.0001*
	(0.0015)	(0.0010)	(0.0001)	(0.0000)	(0.0001)	(0.0001)
Share of agricultural employers	-0.0002	0.0014	0.0000	-0.0001	0.0000	-0.0000
	(0.0004)	(0.0014)	(0.0000)	(0.0001)	(0.0000)	(0.0001)
Share of agricultural own-account	0.1536***	-0.0471**	0.0089***	-0.0073***	0.0109***	-0.0054***
	(0.0136)	(0.0186)	(0.0010)	(0.0013)	(0.0011)	(0.0015)
Share of unpaid workers	0.0185***	0.0516***	0.0008***	0.0013	0.0010***	0.0032***
	(0.0036)	(0.0145)	(0.0002)	(0.0009)	(0.0003)	(0.0012)
Share of unemployed	-0.0083***	-0.0010	-0.0002***	-0.0000	-0.0005***	-0.0002**
	(0.0013)	(0.0011)	(0.0001)	(0.0000)	(0.0001)	(0.0001)
Share of inactive	-0.0090***	0.0329***	-0.0003***	0.0012***	-0.0007***	0.0015***
	(0.0017)	(0.0068)	(0.0001)	(0.0004)	(0.0001)	(0.0005)
Female head	0.0053***	0.0163**	-0.0001	-0.0003	0.0001	0.0000
	(0.0015)	(0.0083)	(0.0001)	(0.0005)	(0.0001)	(0.0006)
Age of head	-0.0342***	0.0221	-0.0018***	0.0318**	-0.0005	-0.0072
	(0.0094)	(0.2010)	(0.0006)	(0.0138)	(0.0007)	(0.0164)
Square of age of head/100	0.0307***	0.0483	0.0019***	-0.0157**	0.0004	0.0055
	(0.0096)	(0.1055)	(0.0006)	(0.0074)	(0.0007)	(0.0087)
Share of basic education	0.0259***	-0.0175***	0.0015***	0.0001	0.0022***	0.0000
	(0.0026)	(0.0067)	(0.0002)	(0.0004)	(0.0002)	(0.0006)
Share of secondary education	0.0439***	-0.0089***	0.0021***	0.0004**	0.0028***	-0.0001
	(0.0032)	(0.0031)	(0.0002)	(0.0002)	(0.0003)	(0.0002)

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A4 Continued: Decomposition results from OBD and UQD (using the employment status of all household members)

	Mean		q10		q25	
Variables	**Explained**	**Unexplained**	**Explained**	**Unexplained**	**Explained**	**Unexplained**
Share of tertiary education	0.0668***	-0.0019	0.0019***	0.0004***	0.0035***	0.0006***
	(0.0042)	(0.0027)	(0.0002)	(0.0001)	(0.0003)	(0.0002)
Christian	0.0137***	-0.0144	0.0009***	0.0005	0.0010***	-0.0010
	(0.0038)	(0.0261)	(0.0003)	(0.0018)	(0.0003)	(0.0022)
Muslim	0.0010	-0.0255***	0.0002*	-0.0009	0.0000	-0.0018***
	(0.0011)	(0.0078)	(0.0001)	(0.0006)	(0.0001)	(0.0007)
Married	0.0001	-0.0053	0.0000	-0.0003	0.0000	-0.0006
	(0.0009)	(0.0083)	(0.0000)	(0.0005)	(0.0000)	(0.0006)
Divorced/widowed	-0.0098***	0.0010	-0.0006***	-0.0001	-0.0010***	0.0001
	(0.0030)	(0.0036)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Akan (major ethnic group)	0.0103***	-0.1135***	0.0010***	-0.0018***	0.0009***	-0.0052***
	(0.0029)	(0.0082)	(0.0002)	(0.0004)	(0.0002)	(0.0006)
Dependency ratio	0.0093***	0.0132	-0.0002	0.0025**	0.0005	0.0002
	(0.0032)	(0.0156)	(0.0002)	(0.0011)	(0.0003)	(0.0014)
Household receives remittances	0.0000	-0.0551***	-0.0000	-0.0023***	-0.0000	-0.0029***
	(0.0002)	(0.0080)	(0.0000)	(0.0005)	(0.0000)	(0.0007)
Household receives rent income	0.0006	-0.0016	-0.0001	0.0001	0.0000	-0.0002
	(0.0011)	(0.0015)	(0.0001)	(0.0001)	(0.0002)	(0.0002)
Household size	0.2485***	-0.1239*	0.0066***	-0.0160***	0.0126***	-0.0150***
	(0.0166)	(0.0717)	(0.0010)	(0.0050)	(0.0012)	(0.0053)
Square of household size	-0.1380***	0.0966***	-0.0020*	0.0039	-0.0044***	0.0032
	(0.0146)	(0.0370)	(0.0010)	(0.0028)	(0.0011)	(0.0027)
Constant		0.5435***		1.0763***		0.9492***
		(0.1066)		(0.0077)		(0.0093)
Observations	13,898	13,898	13,898	13,898	13,898	13,898

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A4 Continued: Decomposition results from OBD and UQD (using the employment status of all household members)

	q50		q75		q90	
Variables	**Explained**	**Unexplained**	**Explained**	**Unexplained**	**Explained**	**Unexplained**
Share of public employees	-0.0002	0.0001	0.0003**	0.0003	0.0003**	-0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
Share of private formal employees	-0.0006**	0.0003	0.0001	-0.0000	0.0003*	-0.0002
	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0002)	(0.0002)
Share of informal paid employees	-0.0004***	0.0004*	-0.0004***	-0.0001	-0.0001**	-0.0003
	(0.0001)	(0.0003)	(0.0001)	(0.0002)	(0.0001)	(0.0002)
Share of non-farm employers	0.0005***	0.0000	0.0005***	0.0001	0.0005***	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Share of agricultural employers	0.0000	-0.0000	-0.0000	0.0001	-0.0001*	0.0002**
	(0.0000)	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0001)
Share of agricultural own-account	0.0108***	-0.0035**	0.0068***	-0.0010	0.0023***	0.0002
	(0.0011)	(0.0016)	(0.0008)	(0.0014)	(0.0005)	(0.0010)
Share of unpaid workers	0.0014***	0.0030**	0.0013***	0.0021*	0.0005***	0.0004
	(0.0003)	(0.0013)	(0.0003)	(0.0011)	(0.0002)	(0.0008)
Share of unemployed	-0.0007***	-0.0002**	-0.0006***	0.0000	-0.0002**	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Share of inactive	-0.0007***	0.0015***	-0.0004***	0.0015***	-0.0002***	0.0001
	(0.0001)	(0.0006)	(0.0001)	(0.0005)	(0.0001)	(0.0004)
Female head	0.0003**	0.0016**	0.0006***	0.0019***	0.0003***	0.0005
	(0.0001)	(0.0006)	(0.0001)	(0.0006)	(0.0001)	(0.0005)
Age of head	-0.0020**	-0.0033	-0.0017**	-0.0086	-0.0014***	-0.0111
	(0.0008)	(0.0179)	(0.0007)	(0.0157)	(0.0005)	(0.0104)
Square of age of head/100	0.0018**	0.0052	0.0013*	0.0088	0.0012***	0.0074
	(0.0008)	(0.0092)	(0.0007)	(0.0080)	(0.0005)	(0.0052)
Share of basic education	0.0020***	-0.0010	0.0009***	-0.0005	0.0002	0.0001
	(0.0002)	(0.0006)	(0.0002)	(0.0006)	(0.0001)	(0.0004)
Share of secondary education	0.0032***	-0.0005*	0.0018***	-0.0006**	0.0006***	-0.0001
	(0.0003)	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0002)

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A4 Continued: Decomposition results from OBD and UQD (using the employment status of all household members)

	q50		q75		q90	
Variables	**Explained**	**Unexplained**	**Explained**	**Unexplained**	**Explained**	**Unexplained**
Share of tertiary education	0.0046***	0.0004*	0.0033***	-0.0004**	0.0020***	-0.0005***
	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0002)	(0.0002)
Christian	0.0007**	-0.0015	0.0002	-0.0004	0.0002	0.0004
	(0.0003)	(0.0020)	(0.0002)	(0.0016)	(0.0001)	(0.0009)
Muslim	-0.0000	-0.0014**	-0.0000	-0.0008	-0.0000	-0.0004
	(0.0001)	(0.0006)	(0.0001)	(0.0005)	(0.0000)	(0.0003)
Married	0.0000	-0.0009	0.0000	0.0003	0.0000	0.0004
	(0.0001)	(0.0006)	(0.0000)	(0.0006)	(0.0000)	(0.0004)
Divorced/widowed	-0.0002	0.0002	-0.0001	0.0002	-0.0002	-0.0004*
	(0.0003)	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0002)
Akan (major ethnic group)	0.0005*	-0.0087***	-0.0000	-0.0064***	-0.0001	-0.0023***
	(0.0003)	(0.0007)	(0.0002)	(0.0006)	(0.0002)	(0.0004)
Dependency ratio	0.0006*	-0.0004	0.0011***	-0.0017*	0.0004***	0.0000
	(0.0003)	(0.0013)	(0.0002)	(0.0010)	(0.0001)	(0.0007)
Household receives remittances	0.0000	-0.0030***	0.0000	-0.0012**	-0.0000	-0.0008*
	(0.0000)	(0.0007)	(0.0000)	(0.0006)	(0.0000)	(0.0004)
Household receives rent income	0.0001	-0.0001	0.0001	-0.0001	0.0001**	-0.0000
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0000)	(0.0000)
Household size	0.0186***	-0.0193***	0.0145***	-0.0048	0.0073***	-0.0001
	(0.0014)	(0.0055)	(0.0012)	(0.0055)	(0.0007)	(0.0036)
Square of household size	-0.0110***	0.0116***	-0.0100***	0.0075***	-0.0053***	0.0031*
	(0.0012)	(0.0028)	(0.0011)	(0.0028)	(0.0007)	(0.0017)
Constant		0.8090***		0.6942***		0.6319***
		(0.0101)		(0.0090)		(0.0060)
Observations	13,898	13,898	13,898	13,898	13,898	13,898

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A5 Full sample estimates from OLS and UQR (using the employment status of heads only)

Variables	Mean	q10	q25	q50	q75	q90
Public employee	0.0059	0.0012	-0.0235	-0.0180	0.0113	0.0611
	(0.0306)	(0.0372)	(0.0322)	(0.0352)	(0.0488)	(0.0687)
Formal private employee	-0.0081	-0.0709**	-0.1077***	-0.0256	0.0269	0.0782
	(0.0222)	(0.0346)	(0.0289)	(0.0282)	(0.0388)	(0.0521)
Informal paid employee	-0.1691***	-0.2250***	-0.1880***	-0.1132***	-0.1216***	-0.1593***
	(0.0416)	(0.0520)	(0.0368)	(0.0365)	(0.0408)	(0.0508)
Non-farm employer	0.2557***	0.0434	0.1001***	0.2389***	0.3344***	0.4675***
	(0.0305)	(0.0445)	(0.0376)	(0.0426)	(0.0582)	(0.0888)
Agricultural employer	0.0606	0.0457	0.1031	-0.0207	-0.0184	0.1547
	(0.0699)	(0.1343)	(0.0918)	(0.0889)	(0.0804)	(0.1017)
Agricultural own-account	-0.2880***	-0.4165***	-0.4578***	-0.3170***	-0.2181***	-0.1097***
	(0.0237)	(0.0446)	(0.0336)	(0.0270)	(0.0265)	(0.0305)
Unpaid worker	-0.2341***	-0.4656***	-0.3379***	-0.1955***	-0.1997***	-0.1500**
	(0.0445)	(0.0914)	(0.0569)	(0.0468)	(0.0553)	(0.0692)
Unemployed	-0.2043***	-0.1793***	-0.1301**	-0.2059***	-0.2529***	-0.2120**
	(0.0505)	(0.0662)	(0.0557)	(0.0685)	(0.0841)	(0.1077)
Inactive	-0.2137***	-0.3011***	-0.2919***	-0.2208***	-0.1862***	-0.1005**
	(0.0262)	(0.0557)	(0.0379)	(0.0338)	(0.0338)	(0.0430)
Female head	0.0685***	0.0720**	0.0006	0.0345	0.1267***	0.1542***
	(0.0183)	(0.0340)	(0.0245)	(0.0221)	(0.0267)	(0.0361)
Age of head	0.0129***	0.0045	0.0101***	0.0103***	0.0174***	0.0141***
	(0.0025)	(0.0066)	(0.0039)	(0.0031)	(0.0036)	(0.0043)
Square of age of head/100	-0.0123***	-0.0054	-0.0100***	-0.0102***	-0.0156***	-0.0118***
	(0.0024)	(0.0066)	(0.0038)	(0.0030)	(0.0034)	(0.0040)
Basic education	0.2478***	0.4112***	0.3444***	0.2745***	0.1593***	0.0731***
	(0.0177)	(0.0315)	(0.0251)	(0.0223)	(0.0232)	(0.0264)
Secondary education	0.3448***	0.3385***	0.3367***	0.3700***	0.3338***	0.3104***
	(0.0213)	(0.0396)	(0.0311)	(0.0308)	(0.0386)	(0.0460)

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A5 Continued: Full sample estimates from OLS and UQR (using the employment status of heads only)

Variables	Mean	q10	q25	q50	q75	q90
Tertiary education	0.5557***	0.3062***	0.3717***	0.5223***	0.6907***	0.7630***
	(0.0274)	(0.0354)	(0.0302)	(0.0341)	(0.0467)	(0.0648)
Christian	0.1693***	0.3753***	0.2934***	0.1166***	0.0378*	0.0263
	(0.0341)	(0.0608)	(0.0341)	(0.0243)	(0.0216)	(0.0237)
Muslim	0.1652***	0.4809***	0.2851***	0.0328	-0.0391*	-0.0111
	(0.0434)	(0.0708)	(0.0388)	(0.0270)	(0.0237)	(0.0246)
Married	0.0667***	0.2428***	0.1859***	0.1142***	-0.1372***	-0.1039*
	(0.0221)	(0.0412)	(0.0277)	(0.0265)	(0.0394)	(0.0557)
Divorced/widowed	-0.0321	0.1853***	0.1294***	0.0153	-0.3085***	-0.2514***
	(0.0256)	(0.0476)	(0.0338)	(0.0314)	(0.0410)	(0.0588)
Akan	0.2581***	0.4674***	0.4069***	0.2698***	0.1201***	0.0322
	(0.0243)	(0.0302)	(0.0228)	(0.0188)	(0.0195)	(0.0247)
Dependency ratio	-0.0520***	-0.0795***	-0.0540***	-0.0511***	-0.0516***	-0.0607***
	(0.0081)	(0.0235)	(0.0131)	(0.0102)	(0.0099)	(0.0106)
Household receives remittances	0.0698***	0.2276***	0.1016***	0.0279*	-0.0149	0.0022
	(0.0173)	(0.0307)	(0.0216)	(0.0167)	(0.0166)	(0.0220)
Household receives rent income	0.0664	0.2079	0.2510*	0.0267	-0.0694	-0.0729
	(0.0698)	(0.1889)	(0.1341)	(0.0865)	(0.0686)	(0.0533)
Household size	-0.1990***	-0.1322***	-0.1796***	-0.2282***	-0.2387***	-0.2130***
	(0.0101)	(0.0190)	(0.0113)	(0.0106)	(0.0141)	(0.0147)
Square of household size	0.0076***	0.0014	0.0053***	0.0092***	0.0112***	0.0106***
	(0.0008)	(0.0015)	(0.0007)	(0.0007)	(0.0009)	(0.0009)
Urban location	0.4005***	0.4386***	0.4868***	0.4821***	0.3601***	0.2523***
	(0.0296)	(0.0317)	(0.0265)	(0.0224)	(0.0226)	(0.0276)
Constant	7.8959***	6.3782***	7.1548***	8.1083***	8.8297***	9.2831***
	(0.0692)	(0.1476)	(0.0928)	(0.0775)	(0.0850)	(0.1005)
Observations	13,898	13,898	13,898	13,898	13,898	13,898
R-squared	0.5120	0.1744	0.3324	0.3973	0.3072	0.1732

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A6 Rural sample estimates from OLS and UQR (using the employment status of heads only)

Variables	Mean	q10	q25	q50	q75	q90
Public employee	0.0041	-0.0368	-0.0789	-0.0045	-0.0236	0.1543
	(0.0502)	(0.0654)	(0.0598)	(0.0649)	(0.0753)	(0.1457)
Formal private employee	-0.0317	-0.0655	-0.1108**	-0.1152**	0.0452	0.1093
	(0.0450)	(0.0517)	(0.0451)	(0.0536)	(0.0628)	(0.1024)
Informal paid employee	-0.2637***	-0.4117***	-0.3215***	-0.2309***	-0.1123*	-0.0011
	(0.0785)	(0.0868)	(0.0642)	(0.0590)	(0.0635)	(0.1112)
Non-farm employer	0.2157***	0.1174**	0.0594	0.2587***	0.1545	0.4061**
	(0.0634)	(0.0532)	(0.0698)	(0.0911)	(0.1053)	(0.1910)
Agricultural employer	0.0194	-0.0067	-0.0413	0.1242	0.0069	-0.0978
	(0.0897)	(0.1315)	(0.0979)	(0.1102)	(0.1266)	(0.1604)
Agricultural own-account	-0.2844***	-0.2399***	-0.3110***	-0.3299***	-0.2731***	-0.2804***
	(0.0316)	(0.0426)	(0.0370)	(0.0402)	(0.0399)	(0.0602)
Unpaid worker	-0.2931***	-0.3860***	-0.4379***	-0.2785***	-0.1660**	-0.2554**
	(0.0719)	(0.1147)	(0.0808)	(0.0655)	(0.0698)	(0.1151)
Unemployed	-0.2462**	-0.2922*	-0.2080	-0.0899	-0.4664***	-0.2299
	(0.1076)	(0.1763)	(0.1294)	(0.1446)	(0.1633)	(0.2515)
Inactive	-0.3029***	-0.2932***	-0.3564***	-0.3379***	-0.2684***	-0.2689***
	(0.0467)	(0.0701)	(0.0549)	(0.0528)	(0.0527)	(0.0743)
Female head	0.0439*	0.0158	0.0408	0.0007	0.0520	0.1334**
	(0.0266)	(0.0448)	(0.0319)	(0.0299)	(0.0355)	(0.0523)
Age of head	0.0115***	-0.0007	0.0038	0.0129***	0.0166***	0.0316***
	(0.0033)	(0.0065)	(0.0048)	(0.0044)	(0.0046)	(0.0062)
Square of age of head/100	-0.0119***	-0.0019	-0.0047	-0.0129***	-0.0166***	-0.0296***
	(0.0032)	(0.0065)	(0.0047)	(0.0041)	(0.0043)	(0.0057)
Basic education	0.2547***	0.3438***	0.3124***	0.3127***	0.1760***	0.0869**
	(0.0243)	(0.0359)	(0.0330)	(0.0329)	(0.0308)	(0.0424)
Secondary education	0.3465***	0.2920***	0.3346***	0.3659***	0.3255***	0.2967***
	(0.0346)	(0.0523)	(0.0484)	(0.0505)	(0.0603)	(0.0856)

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A6 Continued: Rural sample estimates from OLS and UQR (using the employment status of heads only)

Variables	Mean	q10	q25	q50	q75	q90
Tertiary education	0.5642***	0.2548***	0.3405***	0.5261***	0.6740***	0.9345***
	(0.0495)	(0.0561)	(0.0494)	(0.0578)	(0.0729)	(0.1338)
Christian	0.1477***	0.2532***	0.2141***	0.1547***	0.0515*	0.0407
	(0.0416)	(0.0603)	(0.0401)	(0.0310)	(0.0283)	(0.0350)
Muslim	0.1720***	0.3377***	0.2027***	0.1071***	0.0555**	0.0751**
	(0.0516)	(0.0730)	(0.0469)	(0.0367)	(0.0283)	(0.0375)
Married	0.0628*	0.1414**	0.1833***	0.0542	0.0109	-0.2176**
	(0.0376)	(0.0551)	(0.0444)	(0.0411)	(0.0519)	(0.0989)
Divorced/widowed	-0.0320	0.1277**	0.1180**	-0.0071	-0.1341**	-0.4614***
	(0.0397)	(0.0609)	(0.0510)	(0.0500)	(0.0582)	(0.1108)
Akan	0.4198***	0.3975***	0.4307***	0.5160***	0.4003***	0.2823***
	(0.0370)	(0.0374)	(0.0300)	(0.0310)	(0.0298)	(0.0395)
Dependency ratio	-0.0584***	-0.0645***	-0.0528***	-0.0418***	-0.0500***	-0.0663***
	(0.0114)	(0.0214)	(0.0167)	(0.0131)	(0.0124)	(0.0154)
Household receives remittances	0.1417***	0.2794***	0.1729***	0.0910***	0.0437*	0.0883***
	(0.0239)	(0.0399)	(0.0269)	(0.0217)	(0.0224)	(0.0324)
Household receives rent income	0.0621	0.0666	0.2522**	-0.0316	0.0495	-0.1892**
	(0.0850)	(0.1515)	(0.1114)	(0.1106)	(0.1018)	(0.0841)
Household size	-0.1936***	-0.0860***	-0.1527***	-0.2080***	-0.2448***	-0.2829***
	(0.0126)	(0.0181)	(0.0140)	(0.0131)	(0.0170)	(0.0243)
Square of household size	0.0073***	0.0009	0.0044***	0.0076***	0.0106***	0.0131***
	(0.0009)	(0.0013)	(0.0008)	(0.0008)	(0.0010)	(0.0014)
Constant	7.9018***	6.5992***	7.2898***	7.9531***	8.6628***	9.1302***
	(0.0867)	(0.1567)	(0.1123)	(0.1037)	(0.1140)	(0.1621)
Observations	7,932	7,932	7,932	7,932	7,932	7,932
R-squared	0.4043	0.1058	0.2054	0.3068	0.2890	0.1986

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A7 Urban sample estimates from OLS and UQR (using the employment status of heads only)

Variables	Mean	q10	q25	q50	q75	q90
Public employee	0.0074	-0.0488	-0.0443	-0.0147	0.0867*	0.1058
	(0.0343)	(0.0423)	(0.0388)	(0.0360)	(0.0447)	(0.0666)
Formal private employee	0.0112	-0.0266	-0.0256	-0.0349	0.0413	0.1069**
	(0.0250)	(0.0389)	(0.0327)	(0.0321)	(0.0376)	(0.0534)
Informal paid employee	-0.0958***	-0.0993*	-0.0818*	-0.0804**	-0.1284***	-0.0847*
	(0.0312)	(0.0588)	(0.0461)	(0.0375)	(0.0401)	(0.0498)
Non-farm employer	0.2696***	0.1731***	0.2359***	0.2254***	0.2865***	0.4367***
	(0.0364)	(0.0443)	(0.0454)	(0.0457)	(0.0569)	(0.0892)
Agricultural employer	0.0474	-0.2029	-0.0988	0.0197	0.0958	0.3711*
	(0.1017)	(0.2005)	(0.1442)	(0.0923)	(0.1162)	(0.2073)
Agricultural own-account	-0.3562***	-0.7211***	-0.4513***	-0.3292***	-0.1880***	-0.1022***
	(0.0377)	(0.0868)	(0.0486)	(0.0344)	(0.0339)	(0.0357)
Unpaid worker	-0.1591***	-0.2364***	-0.1493**	-0.1605***	-0.1772***	-0.1870**
	(0.0460)	(0.0883)	(0.0628)	(0.0553)	(0.0633)	(0.0772)
Unemployed	-0.1609***	-0.0841	-0.1020	-0.2047***	-0.2148***	-0.1009
	(0.0527)	(0.0851)	(0.0763)	(0.0681)	(0.0736)	(0.0960)
Inactive	-0.1471***	-0.1843***	-0.1846***	-0.1640***	-0.0818**	-0.1198**
	(0.0293)	(0.0575)	(0.0432)	(0.0367)	(0.0363)	(0.0470)
Female head	0.0898***	-0.0337	0.0352	0.0725***	0.1670***	0.1802***
	(0.0206)	(0.0338)	(0.0281)	(0.0252)	(0.0313)	(0.0470)
Age of head	0.0123***	0.0157**	0.0017	0.0099**	0.0119**	0.0214***
	(0.0032)	(0.0066)	(0.0048)	(0.0043)	(0.0051)	(0.0071)
Square of age of head/100	-0.0100***	-0.0155**	-0.0005	-0.0078*	-0.0093*	-0.0180***
	(0.0032)	(0.0067)	(0.0049)	(0.0043)	(0.0050)	(0.0068)
Basic education	0.1967***	0.3158***	0.2677***	0.1978***	0.1497***	0.0775**
	(0.0198)	(0.0417)	(0.0336)	(0.0278)	(0.0278)	(0.0335)
Secondary education	0.3105***	0.3460***	0.3326***	0.3089***	0.2738***	0.2531***
	(0.0274)	(0.0431)	(0.0381)	(0.0353)	(0.0383)	(0.0522)

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A7 Continued: Urban sample estimates from OLS and UQR (using the employment status of heads only)

Variables	Mean	q10	q25	q50	q75	q90
Tertiary education	0.5101***	0.4162***	0.4422***	0.4753***	0.5154***	0.5761***
	(0.0297)	(0.0412)	(0.0408)	(0.0337)	(0.0414)	(0.0616)
Christian	0.1345***	0.2344***	0.1636***	0.1054***	0.0483	0.0825*
	(0.0398)	(0.0803)	(0.0535)	(0.0398)	(0.0408)	(0.0496)
Muslim	0.0406	0.1482*	0.0074	-0.0117	-0.0122	-0.0031
	(0.0523)	(0.0862)	(0.0533)	(0.0408)	(0.0426)	(0.0527)
Married	0.0683***	0.1261***	0.1327***	0.0098	0.0031	0.0446
	(0.0257)	(0.0425)	(0.0344)	(0.0341)	(0.0412)	(0.0643)
Divorced/widowed	-0.0412	0.0860*	0.0413	-0.0916**	-0.1075**	-0.0993
	(0.0332)	(0.0490)	(0.0447)	(0.0403)	(0.0481)	(0.0701)
Akan	0.0668**	0.1788***	0.1015***	0.0451**	-0.0032	-0.0190
	(0.0262)	(0.0326)	(0.0229)	(0.0213)	(0.0249)	(0.0346)
Dependency ratio	-0.0365***	-0.0008	-0.0431***	-0.0321**	-0.0607***	-0.0341**
	(0.0098)	(0.0231)	(0.0165)	(0.0126)	(0.0134)	(0.0167)
Household receives remittances	-0.0260	0.0473	-0.0061	-0.0585***	-0.0299	-0.0214
	(0.0182)	(0.0303)	(0.0240)	(0.0198)	(0.0238)	(0.0332)
Household receives rent income	0.0008	0.4381	0.0479	-0.1223	-0.1258	-0.2972**
	(0.1429)	(0.3547)	(0.2925)	(0.2207)	(0.2044)	(0.1211)
Household size	-0.2244***	-0.1551***	-0.1812***	-0.2298***	-0.2623***	-0.2753***
	(0.0119)	(0.0253)	(0.0174)	(0.0156)	(0.0184)	(0.0260)
Square of household size	0.0105***	0.0036	0.0051***	0.0113***	0.0150***	0.0163***
	(0.0010)	(0.0023)	(0.0013)	(0.0012)	(0.0014)	(0.0019)
Constant	8.4847***	7.2851***	8.1817***	8.6635***	9.1246***	9.2519***
	(0.0920)	(0.1729)	(0.1138)	(0.1038)	(0.1190)	(0.1616)
Observations	5,966	5,966	5,966	5,966	5,966	5,966
R-squared	0.3680	0.1611	0.2330	0.2557	0.2100	0.1240

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A8 Decomposition results from OBD and UQD (using the employment status of heads only)

	Mean		q10		q25	
Variables	**Explained**	**Unexplained**	**Explained**	**Unexplained**	**Explained**	**Unexplained**
Public employee	0.0005	0.0001	-0.0001	-0.0000	-0.0002	0.0001
	(0.0023)	(0.0025)	(0.0001)	(0.0001)	(0.0002)	(0.0002)
Private formal employee	0.0013	0.0026	-0.0001	0.0001	-0.0002	0.0003
	(0.0029)	(0.0030)	(0.0002)	(0.0001)	(0.0002)	(0.0002)
Informal paid employee	-0.0034**	0.0087*	-0.0001*	0.0005***	-0.0002*	0.0006***
	(0.0013)	(0.0048)	(0.0001)	(0.0002)	(0.0001)	(0.0002)
Non-farm employer	0.0104***	0.0007	0.0002***	0.0000	0.0005***	0.0001**
	(0.0016)	(0.0010)	(0.0001)	(0.0000)	(0.0001)	(0.0001)
Agricultural employer	-0.0002	0.0004	0.0000	-0.0001	0.0000	-0.0000
	(0.0006)	(0.0018)	(0.0000)	(0.0001)	(0.0000)	(0.0001)
Agricultural own-account	0.1726***	-0.0419	0.0120***	-0.0103***	0.0128***	-0.0061***
	(0.0190)	(0.0293)	(0.0012)	(0.0016)	(0.0013)	(0.0017)
Unpaid worker	-0.0010	0.0040	-0.0001	0.0001	-0.0001	0.0004**
	(0.0007)	(0.0026)	(0.0000)	(0.0001)	(0.0000)	(0.0002)
Unemployed	-0.0031***	0.0004	-0.0001	0.0000	-0.0001	0.0000
	(0.0011)	(0.0006)	(0.0001)	(0.0000)	(0.0001)	(0.0000)
Inactive	-0.0064***	0.0133***	-0.0003***	0.0002	-0.0005***	0.0006**
	(0.0017)	(0.0050)	(0.0001)	(0.0003)	(0.0001)	(0.0003)
Female head	0.0065***	0.0129	-0.0001	-0.0005	0.0001	-0.0000
	(0.0018)	(0.0103)	(0.0001)	(0.0005)	(0.0001)	(0.0007)
Age of head	-0.0324***	0.0394	-0.0014**	0.0265*	-0.0003	-0.0044
	(0.0101)	(0.2305)	(0.0006)	(0.0142)	(0.0008)	(0.0180)
Square of age of head/100	0.0278***	0.0475	0.0015**	-0.0119	0.0001	0.0053
	(0.0101)	(0.1201)	(0.0006)	(0.0078)	(0.0008)	(0.0096)
Basic education	0.0200***	-0.0130*	0.0011***	0.0001	0.0016***	-0.0001
	(0.0030)	(0.0074)	(0.0002)	(0.0004)	(0.0002)	(0.0005)
Secondary education	0.0273***	-0.0019	0.0010***	0.0002	0.0017***	0.0001
	(0.0032)	(0.0025)	(0.0001)	(0.0001)	(0.0002)	(0.0002)

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A8 Continued: Decomposition results from OBD and UQD (using the employment status of heads only)

	Mean		q10		q25	
Variables	**Explained**	**Unexplained**	**Explained**	**Unexplained**	**Explained**	**Unexplained**
Tertiary education	0.0631***	-0.0030	0.0018***	0.0004***	0.0032***	0.0005**
	(0.0059)	(0.0034)	(0.0002)	(0.0001)	(0.0003)	(0.0002)
Christian	0.0143***	-0.0083	0.0009***	0.0003	0.0010***	-0.0009
	(0.0048)	(0.0344)	(0.0003)	(0.0019)	(0.0003)	(0.0022)
Muslim	0.0012	-0.0230*	0.0002	-0.0009	0.0000	-0.0017**
	(0.0018)	(0.0132)	(0.0001)	(0.0006)	(0.0001)	(0.0007)
Married	-0.0075***	0.0038	-0.0005***	0.0001	-0.0009***	-0.0011
	(0.0029)	(0.0310)	(0.0002)	(0.0015)	(0.0002)	(0.0020)
Divorced/widowed	0.0000	-0.0021	-0.0000	-0.0002	-0.0000	-0.0008
	(0.0004)	(0.0116)	(0.0000)	(0.0006)	(0.0000)	(0.0008)
Akan (major ethnic group)	0.0115**	-0.1161***	0.0011***	-0.0019***	0.0010***	-0.0053***
	(0.0046)	(0.0159)	(0.0002)	(0.0004)	(0.0002)	(0.0006)
Dependency ratio	0.0105***	0.0220	0.0000	0.0019*	0.0007**	0.0002
	(0.0033)	(0.0153)	(0.0002)	(0.0010)	(0.0003)	(0.0012)
Household receives remittances	0.0000	-0.0565***	-0.0000	-0.0023***	0.0000	-0.0031***
	(0.0004)	(0.0099)	(0.0000)	(0.0005)	(0.0000)	(0.0006)
Household receives rent income	-0.0000	-0.0007	-0.0001	0.0001	-0.0000	-0.0001
	(0.0012)	(0.0017)	(0.0001)	(0.0002)	(0.0002)	(0.0002)
Household size	0.2524***	-0.1443*	0.0060***	-0.0129***	0.0119***	-0.0131**
	(0.0227)	(0.0829)	(0.0009)	(0.0045)	(0.0011)	(0.0051)
Square of household size	-0.1405***	0.1008**	-0.0017*	0.0031	-0.0041***	0.0024
	(0.0181)	(0.0443)	(0.0010)	(0.0026)	(0.0010)	(0.0027)
Constant		0.5829***		1.0805***		0.9509***
		(0.1314)		(0.0075)		(0.0091)
Observations	13,898	13,898	13,898	13,898	13,898	13,898

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A8 Continued: Decomposition results from OBD and UQD (using the employment status of heads only)

	q50		q75		q90	
Variables	**Explained**	**Unexplained**	**Explained**	**Unexplained**	**Explained**	**Unexplained**
Public employee	-0.0001	-0.0000	0.0003*	0.0002	0.0002	-0.0000
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
Private formal employee	-0.0003	0.0003	0.0002	-0.0000	0.0003**	0.0000
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
Informal paid employee	-0.0002**	0.0004*	-0.0002***	-0.0001	-0.0001	-0.0001
	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0000)	(0.0001)
Non-farm employer	0.0006***	0.0000	0.0006***	0.0001	0.0004***	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Agricultural employer	-0.0000	-0.0001	-0.0000	0.0001	-0.0001	0.0002*
	(0.0000)	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0001)
Agricultural own-account	0.0115***	-0.0026	0.0048***	0.0021	0.0013***	0.0023**
	(0.0011)	(0.0018)	(0.0008)	(0.0014)	(0.0005)	(0.0009)
Unpaid worker	-0.0001*	0.0001	-0.0001	-0.0000	-0.0000	0.0000
	(0.0000)	(0.0002)	(0.0000)	(0.0001)	(0.0000)	(0.0001)
Unemployed	-0.0003***	-0.0000	-0.0002***	0.0001	-0.0001	0.0000
	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0001)	(0.0000)
Inactive	-0.0005***	0.0007*	-0.0002**	0.0008***	-0.0001***	0.0003
	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0002)
Female head	0.0004***	0.0015**	0.0006***	0.0018***	0.0003***	0.0005
	(0.0001)	(0.0007)	(0.0001)	(0.0006)	(0.0001)	(0.0005)
Age of head	-0.0019**	-0.0018	-0.0017**	-0.0089	-0.0015***	-0.0086
	(0.0009)	(0.0190)	(0.0007)	(0.0149)	(0.0005)	(0.0104)
Square of age of head/100	0.0016*	0.0047	0.0014*	0.0082	0.0013***	0.0057
	(0.0009)	(0.0098)	(0.0007)	(0.0077)	(0.0005)	(0.0053)
Basic education	0.0015***	-0.0009	0.0008***	-0.0002	0.0002**	-0.0000
	(0.0002)	(0.0006)	(0.0002)	(0.0005)	(0.0001)	(0.0003)
Secondary education	0.0020***	0.0001	0.0013***	-0.0001	0.0006***	-0.0000
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4A8 Continued: Decomposition results from OBD and UQD (using the employment status of heads only)

	q50		q75		q90	
Variables	**Explained**	**Unexplained**	**Explained**	**Unexplained**	**Explained**	**Unexplained**
Tertiary education	0.0042***	0.0002	0.0034***	-0.0003	0.0019***	-0.0004**
	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0002)	(0.0002)
Christian	0.0008***	-0.0009	0.0003	0.0000	0.0002	0.0008
	(0.0003)	(0.0019)	(0.0002)	(0.0016)	(0.0002)	(0.0010)
Muslim	-0.0000	-0.0012**	-0.0000	-0.0006	-0.0000	-0.0003
	(0.0001)	(0.0006)	(0.0001)	(0.0005)	(0.0000)	(0.0003)
Married	-0.0001	-0.0017	-0.0000	-0.0003	-0.0001	0.0044**
	(0.0003)	(0.0024)	(0.0002)	(0.0023)	(0.0002)	(0.0020)
Divorced/widowed	0.0000	-0.0015	0.0000	0.0002	0.0000	0.0020***
	(0.0001)	(0.0010)	(0.0000)	(0.0009)	(0.0000)	(0.0007)
Akan (major ethnic group)	0.0006**	-0.0088***	-0.0000	-0.0066***	-0.0001	-0.0024***
	(0.0003)	(0.0007)	(0.0002)	(0.0006)	(0.0001)	(0.0004)
Dependency ratio	0.0007**	0.0001	0.0009***	-0.0008	0.0003**	0.0007
	(0.0003)	(0.0013)	(0.0002)	(0.0009)	(0.0001)	(0.0005)
Household receives remittances	0.0000	-0.0032***	0.0000	-0.0013**	0.0000	-0.0009**
	(0.0000)	(0.0007)	(0.0000)	(0.0006)	(0.0000)	(0.0004)
Household receives rent income	0.0001	-0.0001	0.0001	-0.0001	0.0001**	-0.0000
	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0000)	(0.0000)
Household size	0.0187***	-0.0209***	0.0157***	-0.0085*	0.0082***	-0.0027
	(0.0014)	(0.0054)	(0.0012)	(0.0050)	(0.0007)	(0.0032)
Square of household size	-0.0110***	0.0118***	-0.0107***	0.0086***	-0.0058***	0.0039**
	(0.0012)	(0.0029)	(0.0011)	(0.0027)	(0.0007)	(0.0016)
Constant		0.8146***		0.6980***		0.6242***
		(0.0095)		(0.0075)		(0.0056)
Observations	13,898	13,898	13,898	13,898	13,898	13,898

Bootstrap standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 5A1 Determinants of the degree of rural employment diversification for the 2005/06 dataset (using entropy index for just/only main employment activities)

Variables	(1) Agriculture	(2) Services	(3) Industry	(4) Across	(5) Total
Heads and households' characteristics					
Female head	-0.01399***	0.00713***	0.00153***	0.01309***	0.00775***
	(0.00256)	(0.00097)	(0.00053)	(0.00215)	(0.00143)
Age of head	0.00106***	-0.00035***	-0.00005	-0.00088***	-0.00022
	(0.00029)	(0.00010)	(0.00005)	(0.00024)	(0.00019)
Age square/100	-0.00076***	0.00026***	0.00004	0.00061***	0.00014
	(0.00028)	(0.00010)	(0.00004)	(0.00023)	(0.00019)
Married	-0.00098	0.00120	-0.00033	0.00003	-0.00004
	(0.00242)	(0.00087)	(0.00045)	(0.00203)	(0.00140)
Christian	-0.00161	0.00091*	-0.00007	0.00126	0.00050
	(0.00157)	(0.00048)	(0.00024)	(0.00126)	(0.00087)
Akan, major ethnic group	0.00316	-0.00003	-0.00031	-0.00053	0.00229*
	(0.00218)	(0.00070)	(0.00035)	(0.00184)	(0.00123)
Members with basic education, share	-0.01225***	0.00211**	0.00122**	0.00842***	-0.00048
	(0.00289)	(0.00098)	(0.00050)	(0.00245)	(0.00167)
Members with secondary education, share	-0.03099***	0.00933***	-0.00089	0.03261***	0.01009***
	(0.00678)	(0.00259)	(0.00061)	(0.00648)	(0.00356)
Members with tertiary education, share	-0.08612***	0.02006***	0.00183	0.08013***	0.01592***
	(0.00668)	(0.00356)	(0.00176)	(0.00810)	(0.00594)
Dependency ratio	0.00185**	-0.00064**	-0.00014	-0.00151**	-0.00044
	(0.00088)	(0.00030)	(0.00014)	(0.00070)	(0.00048)
Household size	0.00030	0.00009	-0.00004	0.00016	0.00051***
	(0.00027)	(0.00008)	(0.00004)	(0.00021)	(0.00015)
Receives remittance	-0.00055	0.00041	0.00011	0.00061	0.00057
	(0.00146)	(0.00044)	(0.00023)	(0.00119)	(0.00079)
Landholding (per capita)	0.43545***	-0.05766***	-0.03565***	-0.26185***	0.08021***
	(0.10235)	(0.01793)	(0.00924)	(0.06510)	(0.02852)

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

Table 5A1 Continued: Determinants of the degree of rural employment diversification for the 2005/06 dataset (using entropy index for just/only main employment activities)

Variables	(1) Agriculture	(2) Services	(3) Industry	(4) Across	(5) Total
Community characteristics:					
Seasonal migration	0.00521***	-0.00015	-0.00081***	-0.00327**	0.00105
	(0.00171)	(0.00053)	(0.00030)	(0.00134)	(0.00126)
Distance to marketplace	0.00001	-0.00000	-0.00002	-0.00010	-0.00011*
	(0.00009)	(0.00003)	(0.00001)	(0.00007)	(0.00006)
Distance to financial institution	0.00009	-0.00001	-0.00001	0.00001	0.00008***
	(0.00006)	(0.00001)	(0.00001)	(0.00004)	(0.00003)
Access to electricity (National grid)	-0.00904***	0.00178***	0.00004	0.00888***	0.00164*
	(0.00185)	(0.00057)	(0.00032)	(0.00152)	(0.00097)
Access to passable road	-0.00460***	0.00036	0.00045*	0.00238**	-0.00139*
	(0.00142)	(0.00044)	(0.00024)	(0.00113)	(0.00079)
Access to portable water source	-0.00311**	0.00095**	-0.00005	0.00220*	-0.00003
	(0.00153)	(0.00045)	(0.00025)	(0.00122)	(0.00083)
Community population (in terms of log)	-0.00266***	0.00007	0.00016	0.00157***	-0.00086**
	(0.00072)	(0.00024)	(0.00012)	(0.00060)	(0.00040)
Ecological zone:(reference=savannah)					
Coastal	-0.01590***	0.00207**	0.00063	0.00846***	-0.00475***
	(0.00299)	(0.00102)	(0.00054)	(0.00256)	(0.00179)
Forest	0.00031	-0.00085	0.00020	0.00075	0.00040
	(0.00208)	(0.00068)	(0.00027)	(0.00180)	(0.00109)
Constant	0.07588***	0.00834***	0.00256*	0.29866***	0.38512***
	(0.00860)	(0.00295)	(0.00147)	(0.00720)	(0.00580)
Observations	3,020	3,020	3,020	3,020	3,020
Wald chi2 (22)	689.44	212.07	72.27	471.42	127.71
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000
Wald test of indep. eqns. ($\rho = 0$): chi2 (1)	2.99	0.01	3.16	4.55	0.01
Prob > chi2	0.0839	0.9345	0.0757	0.0329	0.9102

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

Table 5A2 Determinants of the degree of rural employment diversification for the 2016/17 dataset (using entropy index for just/only main employment activities)

Variables	(1) Agriculture	(2) Services	(3) Industry	(4) Across	(5) Total
Heads and households' characteristics					
Female head	-0.01607***	0.01081***	0.00212*	0.02385***	0.01888***
	(0.00287)	(0.00164)	(0.00119)	(0.00575)	(0.00518)
Age of head	0.00125***	-0.00057***	-0.00013	-0.00134**	0.00083
	(0.00033)	(0.00017)	(0.00013)	(0.00064)	(0.00060)
Age square/100	-0.00092***	0.00041**	0.00010	0.00083	-0.00143**
	(0.00032)	(0.00017)	(0.00012)	(0.00063)	(0.00059)
Married	-0.00067	0.00125	-0.00062	-0.00050	0.00555
	(0.00271)	(0.00150)	(0.00104)	(0.00560)	(0.00507)
Christian	-0.00195	0.00159*	0.00004	0.00370	0.00221
	(0.00174)	(0.00086)	(0.00060)	(0.00344)	(0.00277)
Akan, major ethnic group	0.00342	-0.00013	-0.00077	-0.00207	0.00164
	(0.00243)	(0.00128)	(0.00093)	(0.00518)	(0.00403)
Members with basic education, share	-0.01326***	0.00450**	0.00253**	0.02438***	0.02204***
	(0.00322)	(0.00175)	(0.00117)	(0.00650)	(0.00571)
Members with secondary education, share	-0.03449***	0.02253***	-0.00288*	0.07856***	0.06808***
	(0.00761)	(0.00513)	(0.00155)	(0.01761)	(0.01645)
Members with tertiary education, share	-0.09557***	0.05390***	0.00301	0.23856***	0.20079***
	(0.00786)	(0.00754)	(0.00368)	(0.02522)	(0.02565)
Dependency ratio	0.00218**	-0.00113**	-0.00015	-0.00326*	-0.00150
	(0.00098)	(0.00051)	(0.00035)	(0.00188)	(0.00142)
Household size	0.00024	0.00019	-0.00024**	-0.00063	-0.00036
	(0.00030)	(0.00014)	(0.00009)	(0.00061)	(0.00050)
Receives remittance	-0.00060	0.00034	-0.00008	-0.00085	-0.00230
	(0.00162)	(0.00082)	(0.00057)	(0.00331)	(0.00300)
Landholding (per capita)	0.46898***	-0.12327***	-0.09100***	-0.77766***	-0.34496***
	(0.11007)	(0.03613)	(0.02249)	(0.19752)	(0.11264)

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

Table 5A2 Continued: Determinants of the degree of rural employment diversification for the 2016/17 dataset (using entropy index for just/only main employment activities)

Variables	(1) Agriculture	(2) Services	(3) Industry	(4) Across	(5) Total
Community characteristics:					
Seasonal migration	0.00642***	-0.00055	-0.00198***	-0.00538	0.00913***
	(0.00189)	(0.00095)	(0.00073)	(0.00392)	(0.00351)
Distance to marketplace	0.00010	-0.00003	-0.00008***	-0.00004	0.00014
	(0.00010)	(0.00005)	(0.00003)	(0.00020)	(0.00017)
Distance to financial institution	0.00005	-0.00000	-0.00000	-0.00010	-0.00010
	(0.00006)	(0.00003)	(0.00002)	(0.00014)	(0.00012)
Access to electricity (National grid)	-0.01065***	0.00442***	0.00060	0.01852***	0.01128***
	(0.00206)	(0.00106)	(0.00079)	(0.00440)	(0.00392)
Access to passable road	-0.00518***	0.00093	0.00148**	0.00782**	0.00742**
	(0.00158)	(0.00080)	(0.00058)	(0.00323)	(0.00294)
Access to portable water source	-0.00331*	0.00126	0.00014	0.00314	-0.00266
	(0.00171)	(0.00082)	(0.00063)	(0.00347)	(0.00312)
Community population (in terms of log)	-0.00261***	0.00034	0.00035	0.00455***	0.00261*
	(0.00080)	(0.00043)	(0.00029)	(0.00160)	(0.00146)
Ecological zone:(reference=savannah)					
Coastal	-0.01591***	0.00390**	0.00174	0.02457***	0.00641
	(0.00334)	(0.00181)	(0.00129)	(0.00667)	(0.00531)
Forest	-0.00054	-0.00095	0.00098	0.00039	0.00034
	(0.00231)	(0.00125)	(0.00075)	(0.00493)	(0.00382)
Constant	0.08221***	0.01350***	0.00644*	0.39018***	0.43998***
	(0.00958)	(0.00523)	(0.00329)	(0.01881)	(0.01691)
Observations	3,020	3,020	3,020	3,020	3,020
Wald chi2 (22)	497.47	266.28	105.41	359.29	351.00
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000
Wald test of indep. eqns. ($\rho = 0$): chi2 (1)	3.28	3.24	1.89	1.98	3.55
Prob > chi2	0.0699	0.0719	0.1769	0.1594	0.0596

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