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INCOME AND WEALTH IN GHANA: ISSUES OF DISTRIBUTION AND DETERMINANTS

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Abstract
Inequality has been a major problem facing many countries, with Ghana not being an exception. The enormous problems of inequality have engendered worldwide fight (both physical and intellectual) towards its elimination. Unfortunately, the debate on inequality and its decomposition has often been based on income or consumption inequality with little attention on wealth inequality. To get the complete picture of the inequality levels in Ghana, it is appropriate to look at inequality from the wealth angle and then compare the two. Using the Ghana Living Standards Survey of 2006/07 and 2012/13, this study sought to compare the patterns and trends of income and wealth inequality, decompose the Gini coefficient by subgroup and by source, find the marginal effects and then finally look at the effect of economic dependency on income and wealth. The Principal Component Analysis (PCA) was used to calculate the wealth index and the Gini coefficient was used to calculate both wealth and income inequality. The Theil index was used to decompose both income and wealth inequality across all the geographical areas, gender, age, income and asset. The Gini coefficient was further decomposed and their partial derivatives used as marginal effects. The Ordinary Least Squares (OLS) was used to find the effect of economic dependency on income and wealth. Using the Gini coefficient, it was realized that there was a decrease in wealth inequality whereas income inequality increased between 2006 and 2013. However, there were still wide disparities across the geographical areas in terms of either income or household assets. The source component decomposition analyses suggest that income inequality in the urban, rural, male and female have increased over the study period while that of the female has reduced. Asset inequality on the other hand, decreased in the urban but increased around rural, male and female. The study also shows that economic dependency reduces income but increases household assets. This study therefore advocates for policies that will address the needs of the deprived areas through creation of jobs and provision of basic social amenities in order to close the income and the asset inequality gap in Ghana.

Keywords: Income, Asset, Inequality, Dependency, Ghana

Introduction

Although poverty has plagued many countries since time immemorial, various governments have pursued diverse policies and actions to curtail the problem. Eradication of poverty has not just been the headache of one country but has become another type of world war. Its importance brought together all the world's countries and leaders to draw the eight Millennium Development Goals (MDGs) and subsequently the seventeen Sustainable Development Goals (SDGs). They have galvanized unprecedented efforts to meet the needs of the world's poorest. Poverty reduction strategies have traditionally focused on economic growth as the main policy to reduce poverty.

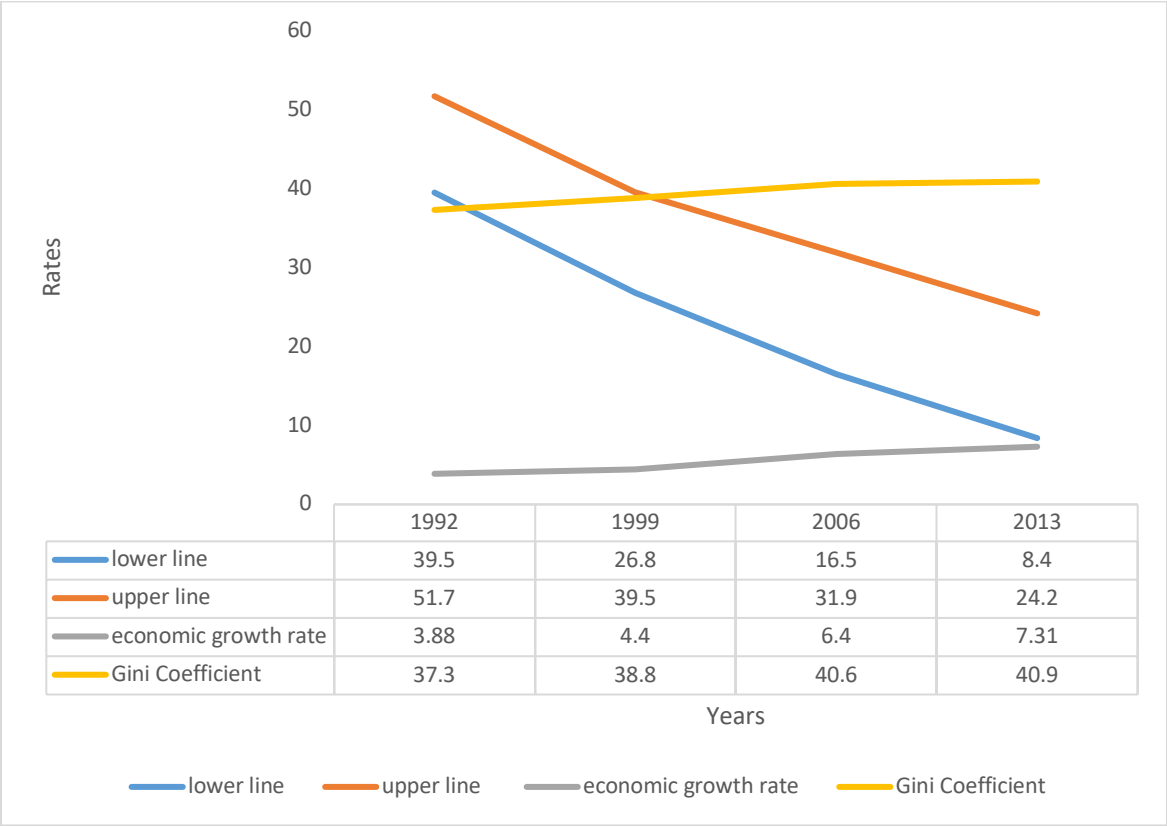

Figure 1: *GDP Growth Rate, Share of Population Below the Lower Poverty Line, and Share of Population Below the Lower Poverty Line*

Source: Authors' Own Computations from WDI and Ghana Statistical Service, 1992, 1999, 2006, 2013.

In pursuance of economic growth, Ghana has adopted several economic growth policies and actions which to some extend yielded some desired results. It is evident that since the adoption of the Structural Adjustment Programme in 1983, Ghana's economic growth rates have been remarkable averaging 4.7% between 1983 and 2000. Between 2000 and 2013 the growth rate averaged 7.2%, reaching an all-time high of 14.4% in 2011, which was believed to be one of the fastest growth rates in the world at the time in the face of the credit crunch.

Between 1992 and 2013, the Ghanaian economy grew by 88.40% which resulted in about 53.19% reduction in poverty (thus, those below the upper poverty line) (see Fig. 1). During the same period, 78.73% of the poor crossed over the lower poverty line (Ghana Statistical Service, 2014). Thus, Ghana stands among the countries that achieved the largest poverty reduction over a sustained period of time. It is evident from Figure 1 that Ghana achieved the MDG 1 (that is halving poverty by 2015) before 2015 (Ghana Statistical Service, 2014).

The increase in economic growth rate and the fall in poverty have not been complemented with a decline in inequality. Figure 1 shows that income inequality has worsened over the 1991/92 to 2012/13 period, with the Gini coefficient of income increasing from 37.3 to 40.9%. Ghana is gradually becoming an unequal country where the benefits of economic growth are not equally distributed across the nation, across gender among others. This development has the potential to destabilise earlier growth, deteriorate social welfare efforts, which can further trickle down to slow the poverty reduction effort. A report on the Economic World Social Situation (2005) warned of the inequality predicaments and argued that failure to pursue a comprehensive, integrated approach to development would perpetuate such a plight, causing all to pay the price. This demonstrates that inequality is very complex and has to be

urgently addressed. No wonder world leaders have crafted two of the SDGs (Goals 5 & 10) purposely for addressing inequality.

According to the United Nations and Department of Economic and Social Affairs (2013), research on inequality in Africa is a recent phenomenon. Most of the studies conducted started in the early 1990s with the availability of household budget surveys for some African countries. In the mid-1990s, the African Economic Research Consortium (AERC) launched a collaborative project on 'Poverty, Income Distribution and Labour Market Issues in Africa'. This, therefore, provided the platform for intellectual interest and debates on inequality issues (United Nations & Department of Economic and Social Affairs, 2013).

In Ghana, there have been a number of studies that have examined inequality spatially through trends and the contributions of household level characteristic to the increasing inequality (see Canagarajah et al., 1998; McKay & Aryeetey, 2007; Coulombe & Wodon, 2007; Aryeetey et al., 2009; Annim, Mariwah and Sebu, 2012). Cooke, Hague and McKay (2016) and Coulombe and Wodon (2007) argue that although Ghana is experiencing high economic growth rates and an appreciable reduction in the poverty incidence as shown in Fig 1, the levels of inequality are however on the increase. Studies conducted by Annim et al. (2012) and Aryeetey et al. (2009) showed that across the regions and districts in the country, there were wide disparities in terms of consumption and income. At the same time, clear and widening disparities at the rural and the urban levels have been observed (Columbe & Wodon, 2007).

Even though the economy has seen all the impressive growth, it has not been associated with improvement in job creation especially among the youth. According to the Ghana Statistical Service (2014), of the inactive population, about 41.2% are among the age group of 15 to 24 years with the same age group experiencing the highest unemployment rate (10.9%) in the country which is about 5% higher than the general population. This has led to a high dependency ratio in the country of 79.5 (Ghana Statistical Service, 2014).

Population dependency may lead to several adverse socioeconomic consequences among which are inequality. According to von Weizsacker (1989), a higher dependency ratio decreases income dispersion. Deaton and Paxson (1994) also claim that high dependency (raising aging) potentially widens inequality. Subsequently, Cameron (2000), Zhong (2011), and Van Vliet and Wang (2015) found a positive linkage between dependency (aging) and income inequality. Recently, Goldin (2016) found that a 1% increase in the elderly dependency ratio leads to a 1.385% increase in the Gini coefficient. Although a number of studies have examined the relationship between dependency and income inequality, the mechanism behind the relationship is still unclear.

Most studies (Cameron (2000), Zhong (2011), Okatch, Siddique, & Rammohan, 2013; Van Vliet & Wang, 2015) measure dependency in terms of children who are below age 18 and/or adults above age 65. We argue that this measure is likely to be misleading in its conclusions on inequality, since there is the possibility of leading to over or under estimation of the dependency among households. To deal with this problem, economic dependency is adopted. Economic dependency is measured as a ratio of the non-income earning members of the household to income-earning members of the household. Given that economic dependency measures how economically active a household is, the lower the rate, the higher the likelihood of a household to escape poverty and hence reduction in its inequality status.

Unfortunately, the debate on inequality and its decomposition has, more often than not, been based on income or consumption inequality with little attention on wealth inequality. One of the weakness of income equality studies in Africa is that incomes are mostly underestimated (due to the fear of tax and high informality of our

economy) making an assessment of wealth the preferred option since respondents are comfortable and also find it easier to report with accuracy (due to the fact that it is associated with prestige and tax free). Due to the problems associated with the income inequality analysis, it is likely that the inequality status of households in Ghana is either overestimated or underestimated. To get the complete picture of the inequality levels in Ghana, it is appropriate to make a comparison between the income and wealth inequality.

Objectives of the Study

Generally, the objective of the study was to compare income and wealth inequality as well as investigate the effect of economic dependency on income and wealth in Ghana. The specific objectives were to:

1. Compare the trends and patterns of both wealth (asset) and income inequality;
2. Decompose income and wealth inequality and assess relative shares of different geographical areas namely, rural-urban, ecological zones, and regions.
3. Examine the effect of economic dependency on household income and household wealth.

Research Questions

The following were the research questions:

1. Are the trends and patterns of wealth (asset) inequality the same as that of the income inequality?
2. To what extent does income and wealth inequality differ across different geographical areas namely, rural-urban, ecological zones, and regions.
3. Does economic dependency influence household income?
4. What is the effect of economic dependency on household wealth?

Economic Inequality in Ghana

Successive Ghana Living Standard Surveys (GLSS) conducted between 1991 and 2013 show that inequality in Ghana has been on the increase (see Table 1). This widening income inequality is also evident across sex, region and locality. These conclusions were reached upon using different kinds of income inequality indices such as Gini coefficient, Mean-log deviation [GE (0)] and Theil index [GE (1)].

All the inequality indices registered an increase for male and female between 1991/1992 and 2012/2013. However, the inequality is more prevalent in the male category than female. This could be explained by the various opportunities in asset acquisition and the type of jobs available for males which are also associated with high levels of competition among them (Baah-Boateng, 2009; Oduro et al., 2011; FAO, 2012). All the indices also indicate that inequality within the groups is more alarming than between the groups (see Table 1).

Despite the increase in the income inequality, the trend of disparities across the regions has been fascinating. With the exception of Ashanti and Eastern Regions, all the other regions recorded a decrease in the income inequality in 1998/1999 (see Table 1). However, in 2005/2006 all the regions recorded an increase in income inequality except Ashanti Region. Again, in 2012/2013, the Ashanti Region was the only region which recorded a decrease in the inequality indices. Between 1991 and 2013, it was only the Ashanti Region that has cumulatively seen a reduction in its inequality while Upper East Region experienced the highest rate of inequality. Even though the inequality indices are so high in the Northern Region, the Upper East Region recorded the highest percentage change in income inequality followed by the Eastern and the Upper West Regions. It is evident that inequality within the regions is more severe than between the regions.

Table 1: Inequality Figures in Ghana by Gender, Location and Region

	1991/1992			1998/1999			2005/2006			2012/2013		
	Gini	Mean-log deviation	Theil	Gini	Mean-log deviation	Theil	Gini	Mean-log deviation	Theil	Gini	Mean-log deviation	Theil
All Ghana	0.373	0.231	0.249	0.388	0.255	0.259	0.406	0.286	0.301	0.409	0.288	0.296
Male	0.372	0.23	0.251	0.385	0.252	0.256	0.412	0.296	0.313	0.414	0.295	0.305
Female	0.366	0.222	0.233	0.392	0.259	0.261	0.38	0.242	0.257	0.392	0.264	0.268
Gender Within	.	0.228	0.246	.	0.254	0.257	.	0.284	0.299	.	0.287	0.295
Gender Between	.	0.003	0.003	.	0.001	0.001	.	0.002	0.002	.	0.001	0.001
Western	0.326	0.172	0.19	0.324	0.174	0.198	0.355	0.207	0.227	0.368	0.23	0.233
Central	0.338	0.192	0.2	0.332	0.177	0.188	0.388	0.245	0.278	0.37	0.232	0.254
Greater Accra	0.354	0.205	0.223	0.3	0.149	0.158	0.41	0.282	0.323	0.356	0.219	0.22
Eastern	0.327	0.174	0.192	0.346	0.201	0.198	0.346	0.191	0.206	0.402	0.27	0.318
Volta	0.339	0.185	0.197	0.304	0.152	0.16	0.319	0.171	0.186	0.365	0.225	0.243
Ashanti	0.376	0.233	0.256	0.38	0.245	0.24	0.377	0.236	0.253	0.371	0.227	0.24
Brong Ahafo	0.349	0.198	0.224	0.333	0.183	0.19	0.357	0.21	0.217	0.369	0.225	0.244
Northern	0.4	0.276	0.285	0.389	0.247	0.291	0.4	0.267	0.272	0.413	0.29	0.322
Upper West	0.326	0.175	0.203	0.316	0.165	0.161	0.399	0.262	0.274	0.395	0.271	0.276
Upper East	0.346	0.197	0.195	0.316	0.161	0.176	0.413	0.291	0.36	0.477	0.383	0.44
Region Within	.	0.203	0.221	.	0.191	0.198	.	0.233	0.255	.	0.242	0.25
Region Between	.	0.028	0.028	.	0.064	0.061	.	0.053	0.046	.	0.046	0.046
Urban	0.347	0.199	0.213	0.349	0.206	0.206	0.373	0.239	0.257	0.373	0.232	0.242
Rural	0.342	0.194	0.212	0.369	0.229	0.239	0.366	0.232	0.238	0.389	0.259	0.277
Urban Within	.	0.196	0.212	.	0.221	0.224	.	0.234	0.248	.	0.246	0.254
Urban Between	.	0.036	0.037	.	0.034	0.035	.	0.052	0.053	.	0.043	0.041

Source: Cooke, Hague and McKay (2016) Appendix Tables 3, 4, 5 and 7.

According to Table 1, all the income inequality indices registered an increase for urban and rural areas between 1991 and 2013. According to FAO (2012), the increasing number of households could be attributed to dominancy of agricultural and the informal sectors in the Ghanaian economy.

The evidence above is indicative enough of the ascendency of income inequality and its possible repercussion on the development of the nation and the fight against poverty.

Literature Review

Theoretical Literature

Concept of Inequality

Inequality, as a concept, according to Gallo (2002) and UN (2015), mostly confuses many in the public deliberation as it tends to mean different things to different people. However, inequality is usually referred to as comparability between elements (Gallo, 2002). The comparison is usually based on some specific features which can be measured using adequate indexes. The inequality can be measured broadly in terms of economic and social dimensions. The concept of economic inequality is further discussed in the literature as inequality of outcomes (wealth, income, education, nutrition) and opportunities (well-being and freedom) (Gallo, 2002). The economic inequality is usually measured using the living standard of an individual or a household which is normally compared in a specific society. However, according to Gallo (2002), no agreement has been made about how the standard of living of an individual should be measured and what exactly the standard of living of an individual means. The disagreements arising from this issue are associated with the difficulties in capturing a person's wellbeing accurately and not only from the different ethical points of view of those who want to measure the extent of inequality (Gallo, 2002).

Concept of Human Capital

The concept of human capital emanated from the economic model of human-resource capitalism, which established the relationship between improved performance and investments in the development of human resources. Due to the shift in the role of human resources, the concept of human capital emerged. According to Becker (1993), the concept of human capital shows that humans are not only resources but are capital which results in returns. Human capital is therefore defined as the knowledge, competencies, values, and social and personal attributes that are embodied in the ability to labour to produce economic value. Some of these traits are acquired through the acquisition of education. The amount of education acquired by an individual will have some impact on the income that the person receives after his or her education. Therefore, the better the human capital of a country's population, the higher the income will be and the lower the inequality among them. This means that a more educated society holds greater welfare.

The dimensions of human capital can be looked at through the following perspectives: individual; human capital accumulation process; and production-oriented. From the individual perspective, Schultz (1961) described the human capital as 'something akin to property' against the concept of labour force in the classical perspective and conceptualized 'the productive capacity of human beings in now vastly larger than all other forms of wealth taken together'. Similar to his view, some researchers have also shown that the human capital could be closely linked to knowledge, skills, education, and abilities (Garavan, Morley, Gunnigle, & Collins, 2001; Youndt, Subramaniam, & Snell, 2004). Rastogi (2002) conceptualises the human capital as 'knowledge, competency, attitude and behaviour embedded in an individual'.

The second perspective is based on human capital itself and its accumulation process. This perspective highlights knowledge and skills obtained throughout educational activities such as primary education, post - secondary education, and vocational education. Despite the extension of that concept, this perspective, however, neglects the fact that human beings

can acquire knowledge and skills through his/her own experience.

The third perspective is closely linked to the production-oriented perspective of human capital. Romer (1997) defines human capital as 'a fundamental source of economic productivity'. Also, Rosen (2004) defined human capital as 'an investment that people make in themselves to increase their productivity'. More recently, Frank, Bernanke and Johnston (2007) argued that human capital is 'an amalgam of factors such as education, experience, training, intelligence, energy, work habits, trustworthiness, and initiative that affect the value of a worker's marginal product'. Considering the production-oriented perspective, the human capital is 'the stock of skills and knowledge embodied in the ability to perform labour so as to produce economic value' (Steven, 2003).

Empirical Literature

Income Inequality

Recent research shows that most countries of the world are faced with the problem of income inequality. For instance, Greg (2007) posited that even rich countries like America face the incidence of income inequality. According to him, in 2005, data from the internal revenue showed that the wealthiest 1% of Americans earned 21.1% of all income. This was high compared with 19% observed in 2004 and surpassed the previous high of 20.8% in 2000. Conversely, the bottom 50% of Americans earned only 12.8% of all income, down from 13.4% in 2004 and a bit less than their 13% share in 2000.

In Lesotho, the poorest 50% of the population had command of only 27% of total expenditure, compared to the wealthiest 10% of household who accounted for over half (51.7%) of total consumption. The significant increase in the overall Gini coefficient was seen to be the result of much-increased inequality among those in rural areas and possibly increased inequality between rural and urban areas, (May, Benjamen, Moqasa, & Woolard, 2004).

Various studies of trends in inequality in individual countries in the sub-Saharan Africa exist. Canagarajah, Mazumdar, and Ye (1998) showed that Tanzania experienced a rising trend in inequality after the economic reform; the Gini coefficient rose by 20 percentage points (from 52 to 72) between 1983 and 1991. Fofack, Monga, and Tuluy (2001) showed that in Burkina Faso, income inequality rose during the period 1994 to 1998, whereas in the case of Nigeria, Canagarajah and Thomas (2001) observed that the Gini coefficient rose by 16% from 0.387 in 1985 to 0.45 in 1992. In Uganda, Appleton, Emwanu, Kagugube and Muwonge (1999) found out that inequality declined from 0.382 to 0.358 Gini coefficient during the period 1992 to 1997. However, the country experienced a reversal of trend between 1997 and 2003, when income inequality rose by eight percentage points, accompanied by a drop in the rate of economic growth.

Morduch and Sicualar (2002) noted that an earlier work on regression-based methods of inequality had been piecemeal, with each proposed approach having different properties and using different inequality indices. Morduch and Sicualar (2002) used a regression-based income inequality decomposition approach on rural data on China over a period of four years to examine how different decomposition rules affect the decomposition results. The findings from Morduch and Sicular's (2002) work vary enormously with the different inequality decomposition indices giving different results. The Theil-T decomposition shows that human capital and demographic variables have been strongly inequality reducing. On the other hand, the Gini decomposition indicates that these variables contribute positively, although modestly, to inequality. Morduch and Sicualar (2002) concluded that the Theil-T decomposition provides a better indicator.

Field (2003) presents a methodology to account for income inequality levels in a given country and differences in income inequality between one period and another. This technique is then applied to the US using survey for two time periods, 1979 and 1999, to analyse labour earnings inequality. The technique starts off by estimating a semi-logarithmic income using Ordinary Least Squares (OLS), which included

the following variables, gender, industry, occupation, education, race, region and experience. Field (2003) further demonstrates the relative factor inequality weights, and the corresponding percentage contributions would be virtually the same for any inequality measure used. Field's (2003) study finds that schooling is the variable that contributes most to high levels of inequality followed by occupation, experience, and gender. In explaining the increase in inequality between the two time periods (1979 and 1999), schooling was again the single most crucial variable followed by occupation. Gender worked in the equalising direction.

Wealth Inequality

Sahn and Stifel (2003) conducted a study in some selected African countries to examine other forms of inequality, including asset (wealth) inequality. The Demographic and Health Surveys (DHS) data was used. They used the Principal Component Analysis (PCA) to construct the asset index. Gini coefficient for asset ownership varied from a high of 0.75 in Niger to the low of 0.43 in Tanzania in the mid-1990s, which suggested that inequality levels in some African countries were considerably low. Sahn and Stifel (2003) also argued that asset-inequality in Africa was much higher in rural areas than in urban areas. Key assets considered in their dataset were: ownership of household durables such as TV, radio, bicycles, motorised transportation and housing characteristics, such as availability of flush toilet, piped water, and the floor material in the house.

Booysen et al. (2004) calculated levels of asset inequality in seven African countries (Ghana, Kenya, Mali, Senegal, Tanzania, Zambia and Zimbabwe) using the DHS data. The construction of the variables was based on binary indicators on four household assets – the presence or absence of a radio, TV, fridge and bicycle; and categorical indicators on three variables – toilet facilities, type of flooring, and main water source. The Multiple Correspondence Analysis (MCA) was used to construct the asset index. Gini coefficients suggested that over the three periods studied, inequality was lowest in Ghana (0.38), followed by Senegal and Zimbabwe (0.5), Kenya and Mali (0.57), Tanzania (0.59), and Zambia (0.63). Also, in the majority of cases, inequality was less in urban areas than in rural areas.

Rady, El- Sheikh and Aly (2009), conducted a study to estimate the wealth Index of households living conditions in Mauritania. The study was conducted to examine the relationship between household socioeconomic positions classified by using asset index and traditional money-metric measures. Data from the Mauritanian Survey on Household Living Conditions was used, and the PCA was used to construct the asset index. Asset index had the potential for providing alternative living standard rankings of the Mauritanian households.

Davila, Gondwe, McCarthy, Kirdruang and Sharma (2010), developed a valid and consistent measure for socioeconomic status at the household level using census microdata available from IPUMS-I, which is the world's largest census database. First, they used the PCA to compute a wealth index based on housing characteristics and asset ownership. They made a validation strategy by comparing the proposed index with the widely used DHS wealth indices. Also, the study sought to verify the predictive power of the index on education enrolment and primary school completion. The results showed a consistently positive effect of the wealth index on education outcomes across four census samples (Peru 1993, South Africa 1996, Brazil 2000, and Colombia 2005).

Policy Relevance

The study advocates for policies that address the needs of the deprived and economically inactive areas through the provision of basic social amenities like electricity and education.

Our variable of interest (economic dependency) also influences policy decisions on the creation of jobs and the provision of social safety nets. This provision can be more localized given that the study focuses on differences in geographical areas namely, rural-urban, ecological zones, districts and regions.

Research Gaps and Contributions to Existing Knowledge

Although some empirical studies (Okatch, Siddique, & Rammohan, 2013) have been conducted on the subject, most of these studies focused on income inequality with little emphasis on wealth (asset) inequality. It was also found (from the literature) that economic inequality studies on Ghana mainly use GLSS data with little and sometimes no attention on other datasets as complimentary datasets. Finally, the existing studies usually describe or talk about the inequality without necessarily picking on the covariates (factors) of this inequality. This study fills the existing research gaps by generating wealth inequality index, compare income and wealth inequality, and finally examine the effect of economic dependency on income and wealth. This study is crucial as world leaders (of which government of Ghana is part) are looking for the best cure to poverty and inequality.

Methodology

Source of Data

The data used in this study was sourced from GLSS 5 and 6 which are nationally representative. The GLSS 5 and GLSS 6, conducted in 2005/2006 and 2012/2013 respectively were obtained from the Ghana Statistical Service. These datasets contain data on household-level, socio-economic characteristics such as education, health, consumption, income, economic activities and demographic characteristics as well as community information. They also provide information on the different forms of income, including the total gross income, total net income, wage income and other forms of income. The GLSS 5 and GLSS 6 were used to measure the income inequality and to analyze the effect of economic dependency on household income inequality.

Data Justification

The total number of households in the GLSS 5 and 6 was 25,459. Of this total, 8,687 were for the GLSS 5 and 16,772 were for the GLSS 6. These two datasets were used to calculate the spatial and trend income inequality across the geographical areas. Furthermore, the sample size for the decomposition of income inequality across all the geographical areas was also 25,459. Having dealt with all the missing values, the sample size for the determination of factors which influence household income and wealth was 2,091 for the GLSS 5 and 2,647 for the GLSS 6.

Justification and Measurement of Variables

The dummy variable for sex of the household is used to capture the income and wealth differences between male-headed households and female-headed households. According to Epo and Baye (2013), households headed by men are likely to be endowed with higher economic welfare. Gender is, therefore, one of the significant determinants of household income and household wealth. If the coefficient of the dummy variable is positive, it will mean that male-headed households have more income or wealth than female-headed households.

Training (education) is expected to affect income and wealth. The human capital theory postulates that education correlates positively with income. The inclusion of this variable is to test whether this theory exists in Ghana. Studies conducted by Awoyemi (2005) for Nigeria; Morduch and Sicular (2002) for China and Martins and Fernandes (2008) for Cape Verde, show that education contributes positively to income and it is also one of the major determinants of income.

Age of the household head is measured as a continuous variable. Age is expected to influence both wealth and income significantly. Studies conducted by Babatunde, Olorunsanya, and Adejola (2008) showed that age is one of the major determinants of income. In this study, the age of the household head and its square are included to establish a relationship. This is to test whether the human capital theory that postulates that income increases with age but at a decreasing rate prevails in the Ghanaian household.

The level of economic dependency is measured as a ratio of the non-income earning members of the household to income-earning members of the household. This measurement is different from the traditional way of measuring

dependency with age. We believe our measure will really bring out the actual dependents in the household. A study conducted by Epo and Baye (2013) shows that dependency is one of the major determinants of income.

The place of residence is included in this study to capture differences emanating in the rural - urban disparities. A dummy is used for the purpose of this study to proxy for such variation. If a household is in the urban area, it is captured as one, and zero if otherwise**.**

Constructing an Asset Index

First, to generate the household wealth index, data on household assets and housing characteristics were used to conduct PCA. The idea is that the underlying variable, wealth, can be predicted by the observed data on assets and housing characteristics. PCA gives us a way to generate weights or coefficients on those observed data (Vyas & Kumaranayake, 2006). Following the approach of Filmer and Pritchett (2001) and Sahn and Stifel (2003), an aggregated one-dimensional index was constructed over the range of different dichotomous variables of household assets.

Given;

$$A_i = b_1 a_{i1} + b_2 a_{i2} + ... + b_k a_{ik} \qquad (1)$$

For $i = 1,...,N$ households and $k = 1,...,K$ household assets. A_i is the asset index, the a_{ik} is the respective asset of the household i, and b_k is the weight for each asset that are used to aggregate the indicators to one- dimensional index.

The PCA was structured by a set of equation where the asset variable was related to a set of latent factors:

$$\tilde{a}_{1i} = V_{11} A_{1i} + V_{12} A_{2i} + ... + V_{1k} A_{ki} \quad ..... \qquad (2)$$

$$\tilde{a}_{ki} = V_{k2} A_{1i} + V_{k2} A_{2i} + ... + V_{kk} A_{ki}$$

where the $\tilde{a}$ are the k asset indicators (the a's in equation 1) normalized by their mean and their standard deviations; A_s are the k principal components and V_s are the weights that relate the principal components to the ownership of the asset (Filmer & Scott, 2008).

Because only the left-hand side of each line is observed, the solution to the problem becomes indeterminate. PCA overcomes this problem by finding the linear combinations of the variables with maximum variance, (the first principal component) A_{ij}. The procedure solves the equation;

$$\left|R - \lambda I\right| V_n = 0 \qquad (3)$$

For R and V_n , where R is the matrix of correlations between the scaled variables (the a_s) and V_n is the vector of coefficients on the nth component for each variable. Solving equation (4) yields the characteristic roots of R, (eigenvalues) and their associated eigen vectors V_n.

After the weights, V, have been estimated, the inversion of the equation system (3) will yield:

$$A_i = b_1 a_{i1} + b_2 a_{i2} + ... + b_k a_{ik} \qquad (4)$$

The equation for the first principal component, which is the equation with the highest variance, represented the asset index.

Calculating Income and Wealth Inequality

The Gini coefficient and the GE class of inequality measures are used to calculate both income and wealth inequality. As the most widely used standard measure of inequality in empirical studies, the Gini coefficient is applied in this study to analyze the changes in both income and wealth inequality over the period of the study. The GE is chosen to enable a decomposition of observed trend in income and wealth inequality in the country. Specifically, the Theil Index, which is a member of the GE measures is used.

Framework

The study adopts the methodology developed by Lerman and Yitzhaki (1985) which is an extension of earlier income decomposition theories developed by Kakwani (1977) and Shorrocks (1982).

As in Novignon (2017), supposed a household has income, *y*, with its lowest level, *a*, highest level, *b*, and the cumulative distribution of income, *F*, then half of the mean Gini difference (*A*) can be written as follows:

$$A = \int_a^b F(y)[1 - F(y)]dy \quad (1)$$

using integration by parts, with $u = F(y)[1 - F(y)] and\ v = y$, we obtain:

$$A = \int_a^b y\left[F(y) - \frac{1}{2}\right] f(y)dy \quad (2)$$

Defining y(F) as the inverse function of F(y), Equation (2) can further be transformed as:

$$A = 2\int_0^1 y(F)\left(F - \frac{1}{2}\right) dF \quad (3)$$

Noting the F is uniformly distributed between [0,1]so that its mean is ½, Equation (3) can be re-written as follows:

$$A = 2cov[y, F(y)] \quad (4)$$

The conventional Gini coefficient can then be derived by dividing Equation (4) by the mean income (m).

Decomposition of Income Inequality

In decomposing the household income inequality, we assume that a household's income has k components such that y = y_1,…, y_k. In that case, A =2cov[y,F(y)] can be re-written as follows using the properties of the covariance and $y = \sum_{k=1}^{K} y_k$;

$$A = 2\sum_{k=1}^{K} cov(y_k, F) \quad (5)$$

where cov (y_k, F) is the covariance of income component k with cumulative distribution of income. The relative Gini coefficient can therefore be obtained by dividing Equation (5) by m while multiplying and dividing each component k by cov(yk, Fk) and by mk, respectively, yields the decomposition by source as follows:

$$G = \sum_{k=1}^{K} [cov(y_k, F)/cov(y_k, F_{k)}] \times \left[\frac{2cov(y_k, F_k)}{m_k}\right]\left[\frac{m_k}{m}\right] \quad (6)$$

Let $R_k = [\frac{cov(y_k F)}{cov(y_k, F_k)}$, $G_k = 2\ cov(y_k, F_k)/m_k$ and$S_k = \frac{m_k}{m}$.. We can then rewrite Equation (6) as follows:

$$G = \sum_{k=1}^{K} R_k \, G_k S_k \qquad (7)$$

where S_k represents the share of source k in total income, G_k is the source Gini corresponding to the distribution of income from source k, R_k represents the Gini correlation of income from source k with the distribution of total income [2].

Stark et al. (1986) noted that the impact of an income element on total inequality depends on: the importance of a particular income source with respect to total income, S_k; how equally or unequally distributed this income source is, G_k; and the correlation between this income source and total income, R_k. Lopez-Feldman (2006) observed that an income component with a large share of total income is likely to have a large impact on inequality. However, an equally distributed income source ($G_k = 0$) cannot influence overall inequality. On the contrary, a large and unequally distributed income source (S_k and G_k are large) can either have an increasing or decreasing effect on total inequality. An increasing or unequalizing effect may occur if the source of inequality favours the rich (R_k is positive and large) while a decreasing or equalizing effect may occur if inequality favours the poor.

Marginal Impact

A look into the impact of small changes (marginal changes) in a particular income source on overall income inequality is critical to any decomposition analysis. Assuming a small change in income from source k equals to ey_k, where e is close to unity and y_k is income from source k. The partial derivative of the Gini coefficient with respect to a percentage change in income source k can be obtained as:

$$\frac{dG}{de_k} = S_k(R_k G_k - G) \qquad (8)$$

where G is the Gini coefficient of total income inequality prior to the income change. It can further be shown that, the percent change in inequality resulting from a small percentage change in income from source k equals the original contribution of source k to income inequality minus source k's share of total income:

$$\frac{dG/de_k}{G} = \frac{S_k G_k R_k}{G} S_k \qquad (9)$$

Effects of Economic Dependency on Household Income and Household Wealth

Estimation Technique

Following Dercon (2006) and Isik – Dikmelik (2006) to conduct the regression analysis, the Ordinary Least Square (OLS) model for the estimation is as follows:

$$\log(yi) = ui + \alpha Xi + \mathcal{E}i$$

Where $\log(yi)$ is the dependent variable, ui is the intercept of the regression equation, and αXi is the explanatory variables which influence household income, α and u are the parameters.

Econometric Model

$$\log income = \beta_0 + \beta_1 ecdep + \beta_2 urban + \beta_3 hhsize + \beta_4 age + \beta_5 agesq + \beta_7 train + \beta_8 reg + \varepsilon_i \qquad (1)$$

$$wealth = \beta_0 + \beta_1 ecdep + \beta_2 urban + \beta_3 hhsize + \beta_4 age + \beta_5 agesq + \beta_7 train + \beta_8 reg + \varepsilon_i \qquad (2)$$

Empirical Results

Trends and Patterns of Inequality in Ghana

Income Inequality

Using the Theil index, we decompose the income inequality into subgroups of the population across the various geographical areas. The motivation for decomposing inequality is to identify which component is contributing to the increasing inequality in Ghana and assess whether the differences are as a result of variations between groups or within groups. The general trends from Table 2 show that both within and between groups inequality increased across all the indicators except rural-urban residences.

Table 2: Trends and Patterns of Inequality in Ghana

Pattern	Trend							
	Income Inequality				Asset Inequality			
	2005-2006		2012-2013		2005-2006		2012-2013	
Factor component	**Between**	**Within**	**Between**	**Within**	**Between**	**Within**	**Between**	**Within**
Rural/Urban	0.020	0.565	0.020	0.799	0.080	0.160	0.072	0.160
Ecological zones	0.013	0.573	0.019	0.802	0.046	0.193	0.046	0.185
Districts	0.115	0.470	0.125	0.704	0.097	0.142	0.095	0.137
Regions	0.030	0.554	0.038	0.786	0.058	0.181	0.048	0.183
Gender	0.000	0.585	0.003	0.816	0.000	0.240	0.000	0.232
Age of HH	0.001	0.584	0.005	0.814	0.001	0.239	0.001	0.231
Wealth	0.068	0.507	0.094	0.725	-	-	-	-
Income	-	-	-	-	0.032	0.210	0.003	0.229
Ghana		**0.585**		**0.819**		**0.240**		**0.232**

Source: Authors' Own Computations from GLSS 5 & 6

Group inequality for rural-urban residences stagnated at 2% between 2006 and 2013, but within groups inequality increased by about 23% from about 56 to 80% over the two survey periods. In addition, inequality between ecological zones, regions and districts showed an increase in both periods while between males and females there was a marginal increase between them. However, within inequality saw a significant increase.

Wealth Inequality

The trends in asset inequality as seen in Table 1 show that there has been a marginal reduction in inequality of about 1% from 24% in 2006 to about 23% in 2013. While rural-urban residence, region, and district saw a reduction in inequality, gender and ecological zones remained unchanged over the period. It is only the income indicator within groups that saw an increase in asset inequality.

Sources of Income Inequality

Table 3 shows the decomposition of household income sources at the national level. Interestingly, in 2006 the largest share to household income came from farm income which accounted for about 37% but dropped to about 11% in 2013, making it the second contributor to inequality. Wage employment represented about 80% of all household income in 2013 with the least contributor being other sources of income during the two periods under consideration.

In terms of the general income inequality, there has been about 2% increase between 2006 and 2013. This shows an increase in the Gini coefficient from about 0.62 in 2006 to 0.64 in 2013. It can also be examined from the share of total inequality (share) that the source of income that contributes most to income inequality is farm income in 2006 and was about 36% and wage employment (78%) in 2013. In 2006, incomes from rent had the least effect on the inequality situation while in 2013, it was self-

employment. From the Gini coefficient correlation with distribution of total income (R_k) it can be shown that in 2006 other sources of income greatly favoured those in the higher income bracket more than the poor followed by wage employment. The tables turned in 2013 showed that wage employment highly benefited the rich with relatively high values of about 0.93 while other sources of income came in second (0.73).

Table 3: Trend in Income Inequality by Source, National

	2005-2006					2012-2013				
Income source	**S_k**	**G_k**	**R_k**	**Share**	**% change**	**S_k**	**G_k**	**R_k**	**Share**	**% change**
Farm	0.3684	0.8458	0.7025	0.3554	-0.0130	0.1109	1.4828	0.6499	0.1662	0.0553
Wage-employ	0.3019	0.8717	0.7568	0.3234	0.0215	0.7988	0.6709	0.9324	0.7772	-0.0216
Self-employ	0.2593	0.8218	0.6801	0.2353	-0.0240	-0.0055	-1.1747	-0.3237	-0.0032	0.0022
Rent	0.0216	0.7754	0.3929	0.0107	-0.0109	0.0504	0.7263	0.503	0.0286	-0.0218
Remittances	0.0938	0.8661	0.5113	0.0674	-0.0263	0.0283	0.8962	0.3147	0.0124	-0.0159
Others sources	0.0124	0.9938	0.7600	0.0152	0.0028	0.0171	0.9891	0.7159	0.0188	0.0017
Total income		0.6158					0.6429			

Source: Authors' Own Computations from GLSS 5 & 6

Note*: S_k, Income Share; G_k, Gini Source; R_k, Correlation with Rank of Total Income*

Marginal Impact of Change in Income Source on Income Inequality

Following Podder (1993), Paul (2004) and Kimhi (2007) we use the marginal effects that show the impact of a percentage change in a specific source of income on the overall income inequality. This helps in analyzing whether a particular source of income has an equalizing or unequalizing effect.

Table 4 reveals that all things being equal, wage employment had an unequalizing effect on the overall income equality at the national level in 2006 but that in 2013 it tended to reduce the inequality. Its worst effect is seen among females where a 1% increase in wage employment income will increase the overall inequality by 0.25%. In 2013, wage employment income had an improving effect on the Gini coefficient for all subgroups except females. While in the national sample, a percentage increase in wage employment income will reduce the inequality by 0.022%, in the urban sample it will reduce it by 0.045% but worsen the Gini coefficient by 0.017% among females.

Generally, it can be observed from Table 4 that, rent and remittances as income sources have a decreasing effect on overall income inequality in the country. This is good news for females and those in the rural areas since it has an equalizing effect on such households. Farm income also tends to work against the effect to improve the income inequality situation among females. The results show that all things being equal, if farm income is increased by 1%, it would worsen the inequality state among females by about 0.021% in both 2006 and 2013 survey periods.

Table 4: Marginal Impact of Change in Income Source on Income Inequality

Income source	2005-2006					2012-2013				
	National	Urban	Rural	Male	Female	National	Urban	Rural	Male	Female
Farm	-0.0130	0.0262	-0.0001	-0.0292	0.0206	0.0553	0.081	0.0348	0.0602	0.0214
Wage-employ	0.0215	0.0055	0.0080	0.0137	0.0253	-0.0216	-0.045	-0.0037	-0.0309	0.0171
Self-employ	-0.0240	-0.0432	-0.0212	-0.0191	-0.0248	0.0022	0.002	0.0022	0.0018	0.0041
Rent	-0.0109	-0.0082	-0.0136	-0.0097	-0.0154	-0.0218	-0.021	-0.0210	-0.0222	-0.0253
Remittances	-0.0263	-0.0349	-0.0256	-0.0144	-0.0416	-0.0159	-0.017	-0.0152	-0.0096	-0.0240
Others sources	0.0028	0.0037	0.0015	0.0027	0.0033	0.0017	0.001	0.0029	0.0007	0.0068

Source: Authors' Own Computations from GLSS 5 & 6

Sources of Asset Inequality

The decomposition of asset inequality by sources is presented in Table 5. It can be observed that in 2006 electricity connection in the home accounted for the biggest share of total household asset of about 32%. Its importance is also seen in terms of how all the other electrical appliances were associated with equally high shares. Possession of radio accounted for about 16%, while electric iron, audio player, fan and refrigerator followed in that order. But the second most important asset was furniture commanding about 18% of the asset share. In 2013, electricity connection in the home dropped to the second place having been overtaken by mobile phones which accounted for about 24% of asset share.

In general, the asset inequality of Gini coefficient increased from about 0.39 in 2006 to 0.40 in 2013. The analysis on the decomposition shows that electricity connection in the home was the most equally distributed asset with a source of Gini coefficient of 0.02 in 2006 while in 2013 mobile phone had a source of Gini coefficient of about 0.24. The most unequally distributed assets in 2006 were computers, motorcycles, cars and boats and canoes, all having source Gini coefficients of over 0.97. With a source Gini coefficient of 0.99, boats and canoes came tops as the most unequal asset followed by video players and cars with a source Gini coefficient of about 0.98 and 0.96 respectively.

A look at the share of total asset inequality shows that television set ownership contributed the highest to the total asset inequality in both 2006 (about 17%) and 2013 (about 19%). In connection with the Gini coefficient correlation with distribution of total asset (R_k), television set ownership and refrigerators favour those in the highest wealth index group more than the other groups. This is shown in the high values of over 0.90 in both years.

Table 5: Trend in Asset Inequality by Source, National

	2005-2006					2012-2013				
Asset source	**S_k**	**G_k**	**R_k**	**Share**	**% change**	**S_k**	**G_k**	**R_k**	**Share**	**% change**
FURNITURE	0.1794	0.4570	0.7205	0.1529	-0.0265	0.1339	0.5843	0.7194	0.1403	0.0064
SEWMACH	0.0689	0.7915	0.4133	0.0583	-0.0106	0.0487	0.8489	0.3141	0.0323	-0.0163
STOVE	0.0557	0.8313	0.8778	0.1052	0.0495	0.0752	0.7665	0.8874	0.1275	0.0523
FRIDGE	0.0661	0.7999	0.9338	0.1278	0.0617	0.0929	0.7117	0.9206	0.1517	0.0588
FAN	0.0929	0.7189	0.9176	0.1585	0.0657	0.13	0.5964	0.9178	0.1774	0.0474
RADIO	0.1573	0.5239	-0.1396	-0.0298	-0.1870	0.1657	0.4856	-0.0966	-0.0194	-0.185
AUDIOPLAYER	0.1450	0.5612	0.6719	0.1415	-0.0035	0.0734	0.772	0.6827	0.0965	0.023
VIDEOPLAYER	0.0439	0.8672	0.9302	0.0916	0.0477	0.0074	0.9769	0.6598	0.012	0.0045
COMPUTER	0.0070	0.9790	0.9206	0.0162	0.0093	0.0307	0.9045	0.8208	0.0569	0.0262
TV	0.0975	0.7048	0.9333	0.1660	0.0685	0.1547	0.5195	0.9294	0.1863	0.0315
IRON	0.1287	0.6106	0.8171	0.1661	0.0374	0.1471	0.5432	0.8218	0.1637	0.0166
BCYCLE	0.0890	0.7305	-0.2866	-0.0482	-0.1373	0.0892	0.7229	-0.3198	-0.0514	-0.1407
MOTORBCYCLE	0.0096	0.9708	0.3097	0.0075	-0.0021	0.0331	0.8971	0.124	0.0092	-0.024
CAR	0.0097	0.9706	0.8824	0.0215	0.0118	0.0141	0.9564	0.7797	0.0261	0.0121
OWNHOUSE	0.1183	0.6419	-0.3092	-0.0608	-0.1790	0.1002	0.6889	-0.2092	-0.036	-0.1362
LANDSIZE	0.0866	0.7380	-0.0797	-0.0132	-0.0997	0.076	0.764	0.0425	0.0062	-0.0699

VESSEL	0.0041	0.9875	-0.4761	-0.0050	-0.0091	0.0018	0.9944	-0.3064	-0.0014	-0.0032
MOBILEPHONE	0.0600	0.8184	0.9078	0.1153	0.0553	0.2448	0.2398	0.7135	0.1044	-0.1404
WATER_1	0.0527	0.8404	0.7812	0.0896	0.0369	0.0835	0.7407	0.351	0.0541	-0.0294
TOILET_1	0.0983	0.7186	-0.2924	-0.0535	-0.1518	0.0355	0.8899	0.836	0.0658	0.0303
ELECTCON_1	0.3245	0.0179	0.3168	0.0048	-0.3197	0.1968	0.389	0.8889	0.1696	-0.0271
Total asset		0.3864					0.4011			

Source: Authors' Own Computations from GLSS 5 & 6

Marginal Impact of Change in Asset Source on Asset Inequality

The marginal impact of the various assets used in the computation of the asset inequality is presented in Table 6. Generally, ownership of the following assets tends to reduce the total asset inequality irrespective of the sub sample used; they are sewing machines, radios, bicycles, ownership of a house, land-size and electricity connection.

Table 6 shows that all things being equal a percentage increase in electricity connection will reduce the Gini coefficient of total asset by about 0.32% at the national level in 2006. The biggest impact was felt in the rural sub sample where a 1% increase in electricity will reduce the Gini coefficient by about 0.48%. In 2013, the biggest contributor to the reduction in asset inequality was in the possession of a radio set. Nationally, it had the potential of reducing asset inequality by about 0.19% while the rural sample experience a reduction in asset inequality all things being of about 0.28%. Interestingly, most of the electrical appliances have an unequalizing effect on assets. Key among them are fans, refrigerators, irons and computers.

Table 6: Marginal Impact of Change in Asset Source on Asset Inequality

Asset source	2005-2006					2012-2013				
	National	Urban	Rural	Male	Female	National	Urban	Rural	Male	Female
FURNITURE	-0.0265	-0.0526	0.0814	-0.0358	-0.0027	0.0064	0.0206	0.0139	-0.0014	0.0238
SEWMACH	-0.0106	-0.0101	0.0321	-0.0108	-0.0052	-0.0163	-0.0102	-0.0146	-0.0190	-0.0071
STOVE	0.0495	0.0541	0.0501	0.0462	0.0646	0.0523	0.0785	0.0344	0.0512	0.0589
FRIDGE	0.0617	0.0616	0.0598	0.0598	0.0701	0.0588	0.0756	0.0522	0.0575	0.0646
FAN	0.0657	0.0254	0.0889	0.0615	0.0755	0.0474	0.0143	0.0702	0.0426	0.0592
RADIO	-0.1870	-0.1135	-0.2866	-0.2065	-0.1311	-0.1850	-0.1107	-0.2825	-0.2105	-0.1151
AUDIOPLAYER	-0.0035	-0.0009	0.0698	-0.0244	0.0455	0.0230	0.0532	0.0247	0.0190	0.0288
VIDEOPLAYER	0.0477	0.0603	0.0418	0.0492	0.0386	0.0045	0.0065	0.0079	0.0045	0.0039
COMPUTER	0.0093	0.0159	0.0044	0.0105	0.0047	0.0262	0.0555	0.0138	0.0272	0.0217
TV	0.0685	0.0359	0.1049	0.0632	0.0803	0.0315	-0.0123	0.0740	0.0248	0.0491
IRON	0.0374	-0.0012	0.1246	0.0310	0.0589	0.0166	0.0038	0.0399	0.0127	0.0292
BCYCLE	-0.1373	-0.0404	-0.2525	-0.1752	-0.0300	-0.1407	-0.0524	-0.2440	-0.1753	-0.0474
MOTORBCYCLE	-0.0021	-0.0005	0.0033	-0.0037	0.0003	-0.0240	-0.0056	-0.0335	-0.0331	-0.0018
CAR	0.0118	0.0204	0.0102	0.0134	0.0056	0.0121	0.0299	0.0067	0.0139	0.0054
OWNHOUSE	-0.1790	-0.0301	-0.3286	-0.1957	-0.1354	-0.1362	-0.0283	-0.2328	-0.1540	-0.0892
LANDSIZE	-0.0997	-0.0319	-0.1475	-0.1032	-0.0979	-0.0699	-0.0155	-0.1112	-0.0774	-0.0515
VESSEL	-0.0091	-0.0031	-0.0188	-0.0118	-0.0008	-0.0032	-0.0008	-0.0059	-0.0043	-0.0002
MOBILEPHONE	0.0553	0.0553	0.0488	0.0540	0.0595	-0.1404	-0.1318	-0.1599	-0.1530	-0.1048
WATER_1	0.0369	0.0108	0.0183	0.0355	0.0487	-0.0294	-0.1041	-0.0051	-0.0170	-0.0618
TOILET_1	-0.1518	-0.0604	-0.2284	-0.1415	-0.1919	0.0303	0.0585	0.0082	0.0295	0.0350
ELECTCON_1	-0.3197	-0.2136	-0.4832	-0.3086	-0.3521	-0.0271	-0.1124	0.0300	-0.01514	-0.0588

Source: Authors' Own Computations from GLSS 5 & 6

Effect of Economic Dependency on Household Income and Household Wealth

Effect of Economic Dependency on Household Income

Using the logarithm of income as the dependent variable, Table 6 shows the regression results capturing the effects of economic dependency and other covariates of income and wealth. The relationship between economic dependency and income is negative and statistically significant at 1% for both rounds of the GLSS. Economic dependency which is measured as a ratio of the non-income earning members of the household to income-earning members of the household has a direct effect on the income of the household. From the result we can infer that a percentage increase in economic dependence had the potential of reducing incomes of the household by about 8% in 2006. While this figure reduced to about 7% in 2013, though the change is marginal. This reduction could be explained in terms of the marginal drop in fertility rate from 4.44 in 2006 to 4.25 in 2013 and/or the improvement in the economic growth of the country. But since there is still a large proportion of the youthful population that are still inactive or unemployed, more needs to be done to reduce the economic dependency even further.

There is also a positive relationship between urban residents and income. This is also significant at 1% for both rounds of the survey. Urban residents tend to increase household productivity and income generation. Generally, households living in urban areas are more exposed to many opportunities which are income generating than rural dwellers. Residing in rural areas has the tendency of reducing the welfare of the households. This may perhaps reflect the inaccessibility of rural households to markets due to lack of roads and other social infrastructure compared to their urban counterparts. We also observe a positive correlation between household size and household income and this is significant at 1% for the two rounds of the survey. This explains that the more the size of the household increases, the more members can contribute resources towards the pool of income. This corroborates studies conducted by Talukder (2014), where household size was the largest positive determinant of income in Bangladesh.

There is a positive correlation between age of the household head and household income and a negative relationship between age squared and household income. The age variable was significant at 1% for the fifth and sixth rounds of the GLSS. Age squared is, however, negative and significant at 1% for both periods. That is, income increases at the early stage, and starts declining at a later stage of life of the household head. This finding is similar to the results obtained by Babatunde et al. (2008), in studying determinants of income poverty in South-Western Nigeria.

Along gender lines, households headed by men are endowed with higher economic welfare because of the likelihood of male heads obtaining jobs more easily than their female counterparts or the discrimination in the job market in favour of men. This is significant at 5% for the fifth round and significant at 1% for both rounds. This is similar to studies conducted by Epo and Baye (2013).

With regard to training, there is a positive relationship between household income and training. The importance and linkage of training to the development and growth of any society and welfare are well known in many literatures. These results are consistent with previous studies using the regression-based inequality decomposition such as studies by Baye and Epo (2011) for Cameroon, Cowel and Fiorio (2009) for Finland, and Wan and Zhou (2005). With regards to regions, using the Upper East region as the base outcome, there was a positive correlation between all the other regions with the exception of the Upper

West region and household income. This is also significant at 1% for both rounds of the survey.

Effects of Economic Dependency on Household Wealth

Table 7 shows the key drivers of asset inequality. We find that there is a positive relationship between economic dependency and asset which is significant at 1% for both rounds. This indicates that the higher the number of inactive population in a household, the lower the wealth of the household. This is true in that the number of economically inactive individuals in the family increases the burden of the economic active population to provide some domestic facilities to engage them. Again, the resources that would otherwise be spent on the members of the family are spent in acquiring more assets for the family. From Table 7, we see that asset accumulation has increased from about 6% in 2006 to about 9% in 2013.

Moving to location of households, the results show that there is a positive relationship between urban residents and wealth. This is consistent for the two rounds and it is significant at 1%. Generally, urban residents tend to have access to household assets compared to the rural dwellers.

There is a negative correlation between household size and household assets and this is significant at 1% for the two rounds. This explains that when there are a lot of people in a household, there tends to be less satisfaction in the acquisition of the household assets.

There is a positive relationship between age of the household head and wealth. This is significant at 1% for both periods. However, there is a negative relationship between age squared and wealth and this is also significant at 1% for both periods. This therefore suggests that access to or ownership of household assets increases with age.

Table 7: Effect of Economic Dependency on Household Income and Household Wealth

	Income		**Asset**	
Variables	**2005-2006**	**2012-2013**	**2005-2006**	**2012-2013**
Economic dependency	-0.0813*** (0.0137)	-0.0670*** (0.0092)	0.0607*** (0.0212)	0.0909*** (0.0119)
Urban	0.4049*** (0.0306)	0.2843*** (0.0241)	2.0877*** (0.0472)	2.0299*** (0.0311)
Household size	0.1817*** (0.0109)	0.1482*** (0.0068)	-0.0195 (0.0169)	-0.0393*** (0.0089)
Age of head	0.0257*** (0.0055)	0.0353*** (0.0043)	0.0515*** (0.0085)	0.0359*** (0.0055)
Age square	-0.0003*** (0.0001)	-0.0003*** (0.0000)	-0.0006*** (0.0001)	-0.0005*** (0.0001)
Male	0.2979*** (0.0318)	0.5185*** (0.0254)	0.6814*** (0.0493)	0.5057*** (0.0327)
Training	0.6013*** (0.0717)	0.5759*** (0.0658)	1.6000*** (0.1114)	1.4397*** (0.0848)
Region (Base = Upper East)				
Western	1.0302*** (0.0699)	1.0939*** (0.0503)	0.6906*** (0.1078)	1.4244*** (0.0644)
Central	1.0380*** (0.0720)	0.5028*** (0.0523)	0.6333*** (0.1114)	0.9174*** (0.0668)
Greater Accra	1.1437*** (0.0693)	1.0000*** (0.0524)	1.8100*** (0.1074)	1.7119*** (0.0669)

Volta	0.6716*** (0.0709)	0.7191*** (0.0515)	0.4795*** (0.1095)	0.7688*** (0.0659)
Eastern	0.8213*** (0.0679)	0.9622*** (0.0498)	0.5038*** (0.1052)	0.8221*** (0.0638)
Ashanti	0.8979*** (0.0636)	1.1017*** (0.0494)	1.0561*** (0.0981)	1.5208*** (0.0634)
Brong Ahafo	0.8364*** (0.0694)	0.7689*** (0.0508)	0.1834* (0.1069)	0.5930*** (0.0648)
Northern	0.6830*** (0.0689)	0.1889*** (0.0506)	-0.1515 (0.1069)	-0.1009 (0.0643)
Upper West	-0.0325 (0.0795)	0.0482 (0.0537)	0.0714 (0.1231)	0.2148*** (0.0680)
Constant	13.3457*** (0.1373)	5.5976*** (0.1058)	-0.0494 (0.2128)	0.4334*** (0.1354)
Observation	7125	14390	7227	14949
F	102.42****	178.94***	318.37***	
R-squared	0.1874	0.1661	0.4140	0.4198

Source: Authors' Own Computations from GLSS 5 & 6

With regard to training, there is a positive relationship between household assets and households that have acquired more skills. With regard to the regions, using the Upper East Region as the base outcome, there was a positive correlation with the exception of the Northern Region and household wealth. All the other regions had more access to household assets compared to their counterparts in the Upper East.

Conclusion

Using the Gini coefficient, it was realized that there was a decrease in wealth inequality whereas income inequality increased from 2006 to 2013. However, there were still wide disparities across the geographical areas in terms of household income or assets. The source component decomposition analyses suggest that income inequality in the urban, rural, and among males have increased over the study period while that of the females have reduced. Asset inequality on the other hand, decreased in the urban but increased within rural, male and female. Farm income and wage employment were found to contribute most to income inequality in 2006 and 2013 respectively. It was also found that economic dependency has a negative effect on income but a positive effect on asset.

Recommendations

- In the urban areas, wage employment has the propensity to reduce inequality in the country. It is therefore important for policy makers to give attention to formalizing the informal sectors of the economy to increase the number of workers who are wage earners. Since it was identified that wage employment also worsens the inequality among females, it is important that attention is given to the wide disparity in gender earnings in the country.
- The analysis on the decomposition shows that electricity connection in the home and mobile phone usage were the most equally distributed asset. This goes to show that access to communication through the mobile phone and electrification projects tend to bridge the gap between the haves and the have not. This is an area policy makers and development practitioners should be interested in.

- While economic dependency has an indirect effect on income inequality, it has a direct effect on asset. As households have more mouths to feed and care for, it puts a huge strain on the little resources of the households. This will call for more to be done in making sure that the teeming youth have jobs to do. More training and entrepreneurship should be encouraged. In addition, more should be done by the National Population Council in reducing the high fertility rate of 4.25 in 2013 to less than 3 births per woman.

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APPENDIX

Inequality Decomposition Framework

A study by Cowell and Fioro (2009) showed that in the United States, Master/PhD qualification and age provided the highest contributions to inequality, while high school education provided an equalising effect. On the other hand, in Finland a college degree and the number of earners in the household were more important. High school education in Finland also provided an equalising effect for Finland.

Wan and Zhou (2005) combined the regression-based decomposition technique and the Shapley value framework developed by Shorrocks (1999) in analysing income inequality in rural China between 1996 and 2002. The study revealed that geographical conditions were the most significant contributor followed by capital input. The only equalizing variable was land input though its impact was minimal.

Baye and Epo (2011) applied the regression-based inequality decomposition approach using Shapley value decomposition rule to explore determinants of income inequality in Cameroon using the 2007 Cameroon household consumption survey. The results of this study indicated that education was the main contributor to inequality.

A study was conducted by Aikaeli (2010) in Tanzania to examine the determinants of rural income. The study showed that the level of education, size of household labour force, acreage of land use and ownership of a non- farm rural enterprise significantly influenced income. In addition, the study also showed that income was lower in female- headed households.

Measures of Inequality

Some of the commonly used measures of inequality are, the Normalized Range, the Relative Mean Deviation, the Variance and Coefficient of Variation and the Standard Deviation of Logarithm.

The Normalized Range**:** The normalized range, R, is calculated as the difference between the richest (Max.y) and poorest (Min.y) people in the income distribution, divided by the mean (μ) (Ferreira, 2000). It is computed as;

$$R = \left(Max.y - Min.y\right) / \mu \qquad (1)$$

If income is evenly distributed, all households will earn the same, and hence R = 0. On the other hand, where one person earns all the income, R = n, where n is the size of the population. Therefore, the value of R always lies between 0 and n. According to Sen (1997), the major limitation of this measure of inequality is that since it makes use of only the highest and lowest values, it completely ignores the values or individuals between the top and bottom of the scale. In addition, it does not meet the criteria of decomposability and principle of transfer but satisfies the criteria of anonymity, population and relative income principles for measuring inequality.

Relative Mean Deviation**:** This measure of inequality improves on the range measure of inequality by not only considering the two extreme levels of income. It has the advantage of involving the entire income distribution. This inequality measure compares the income of each observation with the mean income. It is calculated as the summation of the absolute difference between the mean and each data point on the income scale, divided by the total income, as follows:

$$M = \frac{1}{\mu n} \sum_{i=1}^{m} n_j \mid y_j - \mu \mid \qquad (2)$$

M = 0, when there is perfect inequality and M =2(n-1)/n when there is perfect equality. The main disadvantage with this measure is that it is not sensitive to transfers between households who find themselves on the same side of the mean level of income (Sen, 1997), and hence violates the Pigou-Dalton principle. According to Ferreira (2000), it also tends to violate the relative income principle because it increases with the relative level of income or wealth, meaning that richer people will usually be more unequal than poorer ones. This measure therefore, only satisfies the anonymity and population principles of inequality measurement.

The Variance and Coefficient of Variation: The variance is also computed using the deviation from the mean, but instead of using the absolute differences, these differences are squared. This is shown in equation (3), below;

$$V = \sum_{i=1}^{n} \left(\mu - y_i\right)^2 / n \qquad (3)$$

Standard Deviation of Logarithm; This measure of inequality gives more importance to income transfers at the lower end of the scale. Moreover, the logarithm has the advantage of removing the uncertainty of the units and therefore of the absolute levels. This is computed as;

$$H = \sqrt{\sum_{i=1}^{n} \left(\log \mu - \log y_i\right)^2} / n \qquad (5)$$

This measure of inequality cuts the rise of inequality as it decreases deviation of income but on the other hand, it has the property of highlighting differences at lower levels (Ferreira, 2000).

According to Sen (1997), there are other ways of measuring inequality. These other measures of inequality are the Theil index, the Hoover Index, the Atkinson index and the Gini index. Cowell (1995), argued that any measure of inequality that satisfies all the five principles for measuring inequality should be classified as a member of the Generalized Entropy (GE) class

of inequality measures. Inequality measures of the GE class can be decomposed into sub-groups of within and between inequalities.
The general formula of the GE class of measures is:

$$GE(\infty) = \frac{1}{\infty^2 - \infty}\left[\frac{1}{n}\sum_{i=1}^{n}\left(\frac{y_i}{\mu}\right)^{\alpha} - 1\right] \qquad (6)$$

Where n is the number of individuals in the sample, y_i is the income variable of individual i, and μ is the sample mean of the income variable. The value of GE ranges from 0 to ∞, where higher values indicates greater inequality and 0 represents an equal distribution. The parameter α can take any real value and it represents the weight given to the distances between income variables at different parts of the income distribution. For higher values, GE is more sensitive to upper-end inequality changes and for lower values, GE is more sensitive to low-end inequality changes. One of the members of the GE class is the Theil Index (Omilola, 2009).
The Theil index was first introduced by a Dutch econometrician, Henri Theil in his paper, "Economics and Information Theory (1967)". The index is used to measure inequality, where an aggregated appearance of the index represents a measure of overall inequality. This index, according to Omilola (2009), has the advantage of decomposing overall inequality into distinctive groups. Theil index is known to satisfy all the criteria for measuring inequality. It can easily be derived from equation (6) above. By plugging α values of 0 and 1 into equation (1), the two popular Theil measures of inequality can be derived. These are, the mean log deviation (or Theil L) and the Theil index (or Theil T), respectively. These are represented mathematically as follows:

$$GE(0) = TheilL = \frac{1}{n}\sum_{i=1}^{n}\log\frac{\mu}{y_i} \qquad (7)$$

$$GE(1) = TheilT = \frac{1}{n}\sum_{i=1}^{n}\frac{y_i}{\mu}\log\frac{y_i}{\mu} \qquad (8)$$

The Theil L index tends to be very sensitive to low-end inequality changes. Higher values indicate greater inequality, whilst a zero value indicates perfect equality. Theil T gives equal weights across the distribution, whilst Theil L gives more weight to members at the lower- end of the income distribution. Hence if we are interested in inequality among the poorest, then Theil L will be the best measure to use (Omilola, 2009).
The Atkinson index was first developed by a British economist, Anthony Barnes Atkinson in 1970. The Atkinson index is inter-related with the Theil index, and can therefore be computed from a normalized Theil index. According to (Omilola, 2009), to construct a normative measure of the index, this index introduces a coefficient to weight incomes. The Atkinson index tends to be one of the few indices which account for social welfare.
Corrado Gini developed the Gini coefficient in 1912. Gini coefficient enables the user to compare and study income and wealth distributions over different samples. The Gini coefficient can easily be derived from the Lorenz curve, and hence, has the advantage of being able to offer an easily interpretable picture of inequality (Omilola, 2009). A key disadvantage of the Gini coefficient is that it is more responsive to changes in distribution among the middle classes and tends to be insensitive at the extremes. This insensitivity is greatest in relation to the total income of the poorest. Nevertheless, the Gini coefficient is the most widely quoted measure of inequality. Gini Coefficient is computed as;

$$Gini = \frac{1}{2n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} n_i n_j \mid y_i y_j \mid \qquad (9)$$

Table 3a: Trend in income inequality by source, Urban

Income source	2005-2006					2012-2013				
	S_k	G_k	R_k	Share	% change	S_k	G_k	R_k	Share	% change
Farm	0.1163	1.0815	0.6826	0.1425	0.0262	0.0156	6.0116	0.6712	0.0963	0.0808
Wage-employ	0.4566	0.7876	0.7742	0.4622	0.0055	0.8964	0.6448	0.9597	0.8512	-0.0452
Self-employ	0.3261	0.7805	0.6696	0.2829	-0.0432	-0.006	-1.2245	-0.3287	-0.0037	0.0023
Rent	0.0203	0.8758	0.4101	0.0121	-0.0082	0.0406	0.7409	0.4165	0.0192	-0.0214
Remittances	0.1219	0.8455	0.5088	0.0870	-0.0349	0.0336	0.9038	0.3544	0.0165	-0.0171
Others sources	0.0182	0.9905	0.7314	0.0219	0.0037	0.0198	0.9853	0.6805	0.0204	0.0006
Total income		0.6025					0.6517			

Table 3b: Trend in income inequality by source, Rural

Income source	2005-2006					2012-2013				
	S_k	G_k	R_k	Share	% change	S_k	G_k	R_k	Share	% change
Farm	0.6269	0.7271	0.8470	0.6269	-0.0001	0.2344	1.0141	0.7131	0.2692	0.0348
Wage-employ	0.1433	0.9279	0.7009	0.1513	0.0080	0.6723	0.6935	0.9029	0.6686	-0.0037
Self-employ	0.1907	0.8386	0.6528	0.1695	-0.0212	-0.0047	-1.0816	-0.3103	-0.0025	0.0022
Rent	0.0228	0.6236	0.4013	0.0093	-0.0136	0.0631	0.7049	0.5952	0.042	-0.021
Remittances	0.0650	0.8593	0.4343	0.0394	-0.0256	0.0214	0.8728	0.2096	0.0062	-0.0152
Others sources	0.0065	0.9958	0.7615	0.0080	0.0015	0.0135	0.993	0.7704	0.0165	0.0029
Total income		0.6159					0.6296			

Table 3c: Trend in income inequality by source, Male

Income source	2005-2006					2012-2013				
	S_k	G_k	R_k	Share	% change	S_k	G_k	R_k	Share	% change
Farm	0.3924	0.8166	0.6895	0.3632	-0.0292	0.117	1.496	0.6439	0.1772	0.0602
Wage-employ	0.3329	0.8501	0.7450	0.3466	0.0137	0.8044	0.66	0.927	0.7735	-0.0309
Self-employ	0.2419	0.8315	0.6739	0.2228	-0.0191	-0.0054	-1.1773	-0.3565	-0.0036	0.0018
Rent	0.0213	0.7695	0.4302	0.0116	-0.0097	0.0516	0.7381	0.4909	0.0294	-0.0222
Remittances	0.0607	0.8872	0.5231	0.0463	-0.0144	0.0162	0.9118	0.2838	0.0066	-0.0096
Others sources	0.0125	0.9933	0.7451	0.0152	0.0027	0.0162	0.9875	0.6716	0.0169	0.0007
Total income		0.6084					0.6363			

Table 3d: Trend in income inequality by source, Female

Income source	2005-2006					2012-2013				
	S_k	G_k	R_k	Share	% change	S_k	G_k	R_k	Share	% change
Farm	0.2767	0.9349	0.7094	0.2974	0.0206	0.0851	1.3004	0.5903	0.1064	0.0214
Wage-employ	0.1837	0.9257	0.7585	0.2090	0.0253	0.7751	0.6661	0.9411	0.7922	0.0171
Self-employ	0.3257	0.7921	0.7199	0.3009	-0.0248	-0.0057	-1.1526	-0.1528	-0.0016	0.0041
Rent	0.0225	0.7867	0.2466	0.0071	-0.0154	0.0453	0.6387	0.4245	0.02	-0.0253
Remittances	0.2200	0.7992	0.6262	0.1784	-0.0416	0.0792	0.8518	0.5018	0.0552	-0.024
Others sources	0.0120	0.9946	0.7908	0.0153	0.0033	0.021	0.9924	0.8177	0.0278	0.0068
Total income		0.6172					0.6133			

Table 4a: Marginal impact of change in income source on income inequality

Income source	2005-2006				
	National	Urban	Rural	Male	Female
Farm	-0.0130 (-0.028, -0.001)	0.0262 (0.012, 0.047)	-0.0001 (-0.019, 0.013)	-0.0292 (-0.047, -0.015)	0.0206 (-0.018, 0.052)
Wage-employ	0.0215 (0.012, 0.032)	0.0055 (-0.014, 0.021)	0.0080 (-0.000, 0.028)	0.0137 (-0.006, 0.025)	0.0253 (0.011, 0.051)
Self-employ	-0.0240 (-0.031, -0.015)	-0.0432 (-0.055, -0.032)	-0.0212 (-0.028, -0.011)	-0.0191 (-0.024, -0.009)	-0.0248 (-0.044, -0.006)
Rent	-0.0109 (-0.012, -0.009)	-0.0082 (-0.010, -0.003)	-0.0136 (-0.016, -0.011)	-0.0097 (-0.012, -0.007)	-0.0154 (-0.018, -0.013)
Remittances	-0.0263 (-0.031, -0.020)	-0.0349 (-0.042, -0.023)	-0.0256 (-0.034, -0.012)	-0.0144 (-0.021, -0.006)	-0.0416 (-0.059, -0.014)
Others sources	0.0028 (0.000, 0.005)	0.0037 (-0.002, 0.013)	0.0015 (-0.001, 0.005)	0.0027 (0.000, 0.009)	0.0033 (-0.001, 0.013)

Table 4b: Marginal impact of change in income source on income inequality

Income source	2012-2013				
	National	Urban	Rural	Male	Female
Farm	0.0553 (0.029, 0.117)	0.081 (0.036, 0.159)	0.0348 (0.015, 0.063)	0.0602 (0.030, 0.111)	0.0214 (0.005, 0.039)
Wage-employ	-0.0216 (-0.076, -0.002)	-0.045 (-0.117, 0.000)	-0.0037 (-0.028, 0.024)	-0.0309 (-0.076, -0.001)	0.0171 (-0.005, 0.040)
Self-employ	0.0022 (0.002, 0.003)	0.002 (0.001, 0.003)	0.0022 (0.001, 0.003)	0.0018 (0.001, 0.003)	0.0041 (0.003, 0.005)
Rent	-0.0218 (-0.025, -0.019)	-0.021 (-0.026, -0.017)	-0.0210 (-0.024, -0.017)	-0.0222 (-0.026, -0.016)	-0.0253 (-0.028, -0.021)
Remittances	-0.0159 (-0.018, -0.013)	-0.017 (-0.019, -0.012)	-0.0152 (-0.017, -0.014)	-0.0096 (-0.011, -0.008)	-0.0240 (-0.032, -0.013)

Others sources	0.0017 (-0.002, 0.005)	0.001 (-0.002, 0.008)	0.0029 (-0.002, 0.007)	0.0007 (-0.002, 0.004)	0.0068 (-0.001, 0.029)

Asset source	2005-2006					2012-2013				
	S_k	G_k	R_k	Share	% change	S_k	G_k	R_k	Share	% change
FURNITURE	0.1539	0.3099	0.6683	0.1013	-0.0526	0.1287	0.4238	0.7069	0.1493	0.0206
SEWMACH	0.0550	0.7535	0.3406	0.0449	-0.0101	0.039	0.8255	0.2308	0.0287	-0.0102
STOVE	0.0721	0.6766	0.8134	0.1262	0.0541	0.0947	0.5762	0.8198	0.1731	0.0785
FRIDGE	0.0874	0.6079	0.8818	0.1490	0.0616	0.1113	0.5018	0.8644	0.1869	0.0756
FAN	0.1192	0.4654	0.8200	0.1446	0.0254	0.147	0.3419	0.8288	0.1613	0.0143
RADIO	0.0895	0.5988	-0.1413	-0.0241	-0.1135	0.0984	0.5595	-0.0578	-0.0123	-0.1107
AUDIOPLAYER	0.1247	0.4408	0.7086	0.1238	-0.0009	0.0715	0.6798	0.6626	0.1248	0.0532
VIDEOPLAYER	0.0584	0.7382	0.8663	0.1187	0.0603	0.0065	0.9708	0.5292	0.013	0.0065
COMPUTER	0.0100	0.9550	0.8505	0.0259	0.0159	0.0376	0.8315	0.7687	0.0932	0.0555
TV	0.1195	0.4640	0.8814	0.1554	0.0359	0.1625	0.2727	0.8756	0.1502	-0.0123
IRON	0.1317	0.4094	0.7612	0.1305	-0.0012	0.1478	0.3381	0.7835	0.1517	0.0038
BCYCLE	0.0330	0.8521	-0.0836	-0.0075	-0.0404	0.0359	0.8393	-0.1419	-0.0165	-0.0524
MOTORBCYCLE	0.0066	0.9703	0.3000	0.0061	-0.0005	0.019	0.915	0.1991	0.0134	-0.0056
CAR	0.0124	0.9446	0.8822	0.0327	0.0204	0.0159	0.929	0.8014	0.0457	0.0299
OWNHOUSE	0.0389	0.8256	0.0861	0.0088	-0.0301	0.0396	0.8226	0.0899	0.0114	-0.0283
LANDSIZE	0.0392	0.8241	0.0714	0.0073	-0.0319	0.0424	0.81	0.2025	0.027	-0.0155
VESSEL	0.0011	0.9952	-0.6113	-0.0021	-0.0031	0.0006	0.9972	-0.0637	-0.0002	-0.0008
MOBILEPHONE	0.0809	0.6370	0.8314	0.1363	0.0553	0.1948	0.1278	0.6533	0.063	-0.1318
WATER_1	0.0791	0.6455	0.5538	0.0898	0.0108	0.0935	0.5813	-0.0501	-0.0105	-0.1041
TOILET_1	0.0334	0.8580	-0.2964	-0.0270	-0.0604	0.05	0.776	0.7222	0.1086	0.0585
ELECTCON_1	0.2188	0.0187	0.4043	0.0052	-0.2136	0.1949	0.1273	0.859	0.0825	-0.1124
Total Asset		0.3145					0.2583			

Table 5a: Trend in wealth inequality by source, Urban

Table 5b: Trend in wealth inequality by source, Rural

Asset source	2005-2006					2012-2013				
	S_k	G_k	R_k	Share	% change	S_k	G_k	R_k	Share	% change
FURNITURE	0.2203	0.5618	0.7436	0.3017	0.0814	0.143	0.7124	0.6726	0.1569	0.0139
SEWMACH	0.0912	0.8185	0.5038	0.1234	0.0321	0.0659	0.8675	0.3922	0.0513	-0.0146
STOVE	0.0294	0.9414	0.8756	0.0795	0.0501	0.0407	0.9182	0.8786	0.0751	0.0344
FRIDGE	0.0319	0.9366	0.9366	0.0916	0.0598	0.0602	0.879	0.9283	0.1124	0.0522
FAN	0.0506	0.8994	0.9350	0.1394	0.0889	0.0997	0.7994	0.9312	0.17	0.0702
RADIO	0.2661	0.4706	-0.0499	-0.0205	-0.2866	0.2851	0.4267	0.0091	0.0025	-0.2825
AUDIOPLAYER	0.1775	0.6469	0.6568	0.2473	0.0698	0.0768	0.8455	0.6826	0.1015	0.0247
VIDEOPLAYER	0.0206	0.9590	0.9626	0.0624	0.0418	0.0091	0.9817	0.8297	0.0169	0.0079
COMPUTER	0.0020	0.9960	0.9680	0.0064	0.0044	0.0185	0.9628	0.7921	0.0323	0.0138
TV	0.0622	0.8763	0.9349	0.1671	0.1049	0.141	0.7164	0.9297	0.215	0.074
IRON	0.1238	0.7537	0.8118	0.2484	0.1246	0.1458	0.7068	0.7871	0.1857	0.0399
BCYCLE	0.1790	0.6439	-0.1945	-0.0735	-0.2525	0.1839	0.6301	-0.2262	-0.06	-0.244
MOTORBCYCLE	0.0145	0.9712	0.3850	0.0177	0.0033	0.0583	0.8828	0.2103	0.0248	-0.0335
CAR	0.0055	0.9891	0.8856	0.0157	0.0102	0.0108	0.9782	0.7228	0.0176	0.0067
OWNHOUSE	0.2457	0.5113	-0.2013	-0.0829	-0.3286	0.2077	0.5824	-0.0907	-0.0251	-0.2328
LANDSIZE	0.1625	0.6767	0.0416	0.0150	-0.1475	0.1356	0.7272	0.1083	0.0245	-0.1112
VESSEL	0.0090	0.9821	-0.3390	-0.0098	-0.0188	0.0039	0.9922	-0.2301	-0.002	-0.0059
MOBILEPHONE	0.0264	0.9475	0.9172	0.0752	0.0488	0.3336	0.3291	0.6911	0.1737	-0.1599
WATER_1	0.0105	0.9791	0.8522	0.0288	0.0183	0.0657	0.8678	0.464	0.0606	-0.0051
TOILET_1	0.2025	0.6194	-0.0630	-0.0259	-0.2284	0.0096	0.9808	0.8272	0.0178	0.0082
ELECTCON_1	0.4940	0.0173	0.3827	0.0107	-0.4832	0.2	0.5977	0.8404	0.23	0.03
Total Asset		0.3050					0.4368			

Table 5c: Trend in wealth inequality by source, Male

Asset source	2005-2006					2012-2013				
	S_k	G_k	R_k	Share	% change	S_k	G_k	R_k	Share	% change
FURNITURE	0.1839	0.4226	0.7471	0.1480	-0.0358	0.1437	0.5457	0.7344	0.1423	-0.0014
SEWMACH	0.0643	0.7980	0.4092	0.0536	-0.0108	0.0475	0.85	0.286	0.0285	-0.019
STOVE	0.0541	0.8303	0.8761	0.1003	0.0462	0.0722	0.7717	0.8963	0.1234	0.0512
FRIDGE	0.0667	0.7905	0.9405	0.1265	0.0598	0.0919	0.7094	0.9273	0.1494	0.0575
FAN	0.0973	0.6944	0.9216	0.1588	0.0615	0.1334	0.5782	0.9235	0.176	0.0426
RADIO	0.1656	0.4799	-0.2016	-0.0409	-0.2065	0.1779	0.4378	-0.1697	-0.0326	-0.2105

AUDIOPLAYER	0.1614	0.4931	0.6753	0.1371	-0.0244	0.084	0.7344	0.6757	0.103	0.019
VIDEOPLAYER	0.0495	0.8446	0.9258	0.0987	0.0492	0.0084	0.9734	0.6398	0.0129	0.0045
COMPUTER	0.0082	0.9742	0.9198	0.0187	0.0105	0.0341	0.8921	0.8152	0.0613	0.0272
TV	0.1030	0.6767	0.9355	0.1662	0.0632	0.158	0.5004	0.9356	0.1828	0.0248
IRON	0.1293	0.5940	0.8183	0.1602	0.0310	0.1467	0.5363	0.82	0.1594	0.0127
BCYCLE	0.1107	0.6524	-0.3500	-0.0645	-0.1752	0.1096	0.6536	-0.3711	-0.0657	-0.1753
MOTORBCYCLE	0.0124	0.9612	0.2845	0.0086	-0.0037	0.0429	0.8645	0.1063	0.0097	-0.0331
CAR	0.0117	0.9632	0.8712	0.0251	0.0134	0.0173	0.9454	0.7736	0.0312	0.0139
OWNHOUSE	0.1282	0.5974	-0.3458	-0.0675	-0.1957	0.1119	0.6463	-0.2357	-0.0421	-0.154
LANDSIZE	0.0923	0.7101	-0.0649	-0.0108	-0.1032	0.0848	0.7319	0.0484	0.0074	-0.0774
VESSEL	0.0052	0.9835	-0.5013	-0.0066	-0.0118	0.0023	0.9927	-0.34	-0.0019	-0.0043
MOBILEPHONE	0.0624	0.8042	0.9098	0.1163	0.0540	0.2485	0.2143	0.7261	0.0956	-0.153
WATER_1	0.0483	0.8484	0.8024	0.0838	0.0355	0.0744	0.7649	0.4085	0.0574	-0.017
TOILET_1	0.0955	0.7157	-0.2636	-0.0460	-0.1415	0.033	0.8958	0.8565	0.0625	0.0295
ELECTCON_1	0.3128	0.0178	0.2965	0.0042	-0.3086	0.1858	0.4126	0.901	0.1707	-0.0151
Total Asset		0.3922					0.4048			

Table 5d: Trend in wealth inequality by source, Female

Asset source	2005-2006					2012-2013				
	S_k	G_k	R_k	Share	% change	S_k	G_k	R_k	Share	% change
FURNITURE	0.1661	0.5459	0.6529	0.1634	-0.0027	0.1071	0.6826	0.6959	0.131	0.0238
SEWMACH	0.0824	0.7746	0.4379	0.0772	-0.0052	0.0519	0.8462	0.3966	0.0448	-0.0071
STOVE	0.0607	0.8340	0.8968	0.1253	0.0646	0.0833	0.7531	0.8808	0.1422	0.0589
FRIDGE	0.0642	0.8243	0.9189	0.1343	0.0701	0.0954	0.7173	0.9083	0.16	0.0646
FAN	0.0796	0.7822	0.9018	0.1551	0.0755	0.1206	0.6427	0.9012	0.1798	0.0592
RADIO	0.1325	0.6377	0.0058	0.0014	-0.1311	0.1325	0.6073	0.0843	0.0175	-0.1151
AUDIOPLAYER	0.0961	0.7372	0.7237	0.1416	0.0455	0.0447	0.8676	0.7362	0.0735	0.0288
VIDEOPLAYER	0.0273	0.9254	0.9451	0.0658	0.0386	0.0049	0.9856	0.7139	0.0088	0.0039
COMPUTER	0.0032	0.9912	0.9017	0.0080	0.0047	0.0215	0.9362	0.8336	0.0432	0.0217
TV	0.0813	0.7776	0.9259	0.1617	0.0803	0.1457	0.5683	0.914	0.1948	0.0491
IRON	0.1268	0.6533	0.8121	0.1857	0.0589	0.1483	0.5607	0.8293	0.1774	0.0292
BCYCLE	0.0248	0.9322	-0.0812	-0.0052	-0.0300	0.034	0.8993	-0.1707	-0.0134	-0.0474
MOTORBCYCLE	0.0015	0.9958	0.4365	0.0018	0.0003	0.0067	0.9801	0.2883	0.0049	-0.0018
CAR	0.0037	0.9899	0.9189	0.0093	0.0056	0.0053	0.9843	0.8009	0.0107	0.0054
OWNHOUSE	0.0889	0.7570	-0.2501	-0.0465	-0.1354	0.0684	0.7974	-0.1487	-0.0209	-0.0892
LANDSIZE	0.0695	0.8100	-0.1830	-0.0284	-0.0979	0.0521	0.8455	0.0052	0.0006	-0.0515
VESSEL	0.0008	0.9979	0.0019	0.0000	-0.0008	0.0004	0.9987	0.1866	0.0002	-0.0002
MOBILEPHONE	0.0530	0.8551	0.8995	0.1125	0.0595	0.2347	0.3047	0.7058	0.1299	-0.1048
WATER_1	0.0659	0.8197	0.7683	0.1146	0.0487	0.1083	0.6792	0.2454	0.0464	-0.0618
TOILET_1	0.1066	0.7259	-0.3994	-0.0853	-0.1919	0.0422	0.875	0.8125	0.0772	0.035
ELECTCON_1	0.3591	0.0181	0.3888	0.0070	-0.3521	0.2265	0.3289	0.8747	0.1677	-0.0588
Total Asset		0.3622					0.3886			

Table 6a: Marginal impact of change in income source on asset inequality

Asset source	2005-2006				
	National	**Urban**	**Rural**	**Male**	**Female**
FURNITURE	-0.0265 (-0.032, -0.022)	-0.0526 (-0.056, -0.047)	0.0814 (0.071, 0.102)	-0.0358 (-0.042, -0.030)	-0.0027 (-0.011, 0.008)
SEWMACH	-0.0106 (-0.015, -0.007)	-0.0101 (-0.015, -0.005)	0.0321 (0.028, 0.041)	-0.0108 (-0.014, -0.006)	-0.0052 (-0.010, 0.006)
STOVE	0.0495 (0.047, 0.052)	0.0541 (0.051, 0.057)	0.0501 (0.046, 0.055)	0.0462 (0.044, 0.048)	0.0646 (0.062, 0.068)
FRIDGE	0.0617 (0.060, 0.063)	0.0616 (0.059, 0.064)	0.0598 (0.056, 0.065)	0.0598 (0.059, 0.061)	0.0701 (0.066, 0.073)
FAN	0.0657 (0.063, 0.068)	0.0254 (0.022, 0.028)	0.0889 (0.084, 0.093)	0.0615 (0.059, 0.064)	0.0755 (0.072, 0.081)
RADIO	-0.1870 (-0.192, -0.182)	-0.1135 (-0.123, -0.106)	-0.2866 (-0.303, -0.273)	-0.2065 (-0.214, -0.200)	-0.1311 (-0.145, -0.120)
AUDIOPLAYER	-0.0035 (-0.007, -0.001)	-0.0009 (-0.008, 0.004)	0.0698 (0.060, 0.078)	-0.0244 (-0.030, -0.020)	0.0455 (0.041, 0.053)
VIDEOPLAYER	0.0477 (0.046, 0.049)	0.0603 (0.058, 0.063)	0.0418 (0.037, 0.046)	0.0492 (0.047, 0.050)	0.0386 (0.035, 0.043)
COMPUTER	0.0093 (0.008, 0.010)	0.0159 (0.013, 0.018)	0.0044 (0.002, 0.006)	0.0105 (0.009, 0.012)	0.0047 (0.003, 0.007)
TV	0.0685 (0.067, 0.070)	0.0359 (0.033, 0.041)	0.1049 (0.101, 0.113)	0.0632 (0.061, 0.066)	0.0803 (0.078, 0.085)
IRON	0.0374 (0.033, 0.041)	-0.0012 (-0.007, 0.006)	0.1246 (0.118, 0.132)	0.0310 (0.028, 0.035)	0.0589 (0.053, 0.068)
BCYCLE	-0.1373 (-0.143, -0.131)	-0.0404 (-0.046, -0.035)	-0.2525 (-0.266, -0.240)	-0.1752 (-0.186, -0.168)	-0.0300 (-0.041, -0.023)
MOTORBCYCLE	-0.0021 (-0.004, -0.001)	-0.0005 (-0.002, 0.002)	0.0033 (-0.002, 0.007)	-0.0037 (-0.007, -0.002)	0.0003 (-0.001, 0.001)
CAR	0.0118 (0.010, 0.014)	0.0204 (0.018, 0.023)	0.0102 (0.008, 0.014)	0.0134 (0.012, 0.015)	0.0056 (0.003, 0.008)
OWNHOUSE	-0.1790 (-0.184, -0.171)	-0.0301 (-0.041, -0.026)	-0.3286 (-0.345, -0.315)	-0.1957 (-0.207, -0.189)	-0.1354 (-0.149, -0.125)
LANDSIZE	-0.0997 (-0.109, -0.093)	-0.0319 (-0.037, -0.026)	-0.1475 (-0.162, -0.133)	-0.1032 (-0.115, -0.098)	-0.0979 (-0.115, -0.088)
VESSEL	-0.0091 (-0.011, -0.007)	-0.0031 (-0.005, -0.002)	-0.0188 (-0.024, -0.014)	-0.0118 (-0.014, -0.010)	-0.0008 (-0.001, 0.000)
MOBILEPHONE	0.0553	0.0553	0.0488	0.0540	0.0595

	(0.054, 0.056)	(0.053, 0.058)	(0.045, 0.053)	(0.052, 0.055)	(0.055, 0.062)
WATER_1	0.0369 (0.035, 0.039)	0.0108 (0.007, 0.017)	0.0183 (0.017, 0.021)	0.0355 (0.033, 0.038)	0.0487 (0.045, 0.055)
TOILET_1	-0.1518 (-0.160, -0.145)	-0.0604 (-0.072, -0.053)	-0.2284 (-0.248, -0.201)	-0.1415 (-0.150, -0.133)	-0.1919 (-0.221, -0.176)
ELECTCON_1	-0.3197 (-0.324, -0.315)	-0.2136 (-0.220, -0.211)	-0.4832 (-0.492, -0.475)	-0.3086 (-0.317, -0.303)	-0.3521 (-0.360, -0.341)

Table 6b: Marginal impact of change in asset source on asset inequality

	2012-2013				
Asset source	**National**	**Urban**	**Rural**	**Male**	**Female**
FURNITURE	0.0064 (0.004, 0.008)	0.0206 (0.017, 0.025)	0.0139 (0.009, 0.016)	-0.0014 (-0.004, 0.000)	0.0238 (0.020, 0.028)
SEWMACH	-0.0163 (-0.018, -0.014)	-0.0102 (-0.015, -0.007)	-0.0146 (-0.018, -0.010)	-0.0190 (-0.022, -0.017)	-0.0071 (-0.011, -0.002)
STOVE	0.0523 (0.051, 0.053)	0.0785 (0.075, 0.081)	0.0344 (0.033, 0.037)	0.0512 (0.050, 0.052)	0.0589 (0.057, 0.062)
FRIDGE	0.0588 (0.058, 0.060)	0.0756 (0.071, 0.078)	0.0522 (0.051, 0.054)	0.0575 (0.056, 0.059)	0.0646 (0.063, 0.067)
FAN	0.0474 (0.046, 0.049)	0.0143 (0.012, 0.018)	0.0702 (0.068, 0.071)	0.0426 (0.041, 0.044)	0.0592 (0.057, 0.061)
RADIO	-0.1850 (-0.188, -0.177)	-0.1107 (-0.115, -0.103)	-0.2825 (-0.291, -0.270)	-0.2105 (-0.216, -0.205)	-0.1151 (-0.122, -0.104)
AUDIOPLAYER	0.0230 (0.021, 0.025)	0.0532 (0.048, 0.057)	0.0247 (0.021, 0.028)	0.0190 (0.016, 0.021)	0.0288 (0.026, 0.031)
VIDEOPLAYER	0.0045 (0.004, 0.005)	0.0065 (0.005, 0.008)	0.0079 (0.007, 0.009)	0.0045 (0.004, 0.006)	0.0039 (0.002, 0.005)
COMPUTER	0.0262 (0.025, 0.027)	0.0555 (0.054, 0.058)	0.0138 (0.012, 0.016)	0.0272 (0.026, 0.028)	0.0217 (0.020, 0.025)
TV	0.0315 (0.030, 0.034)	-0.0123 (-0.016, -0.010)	0.0740 (0.072, 0.078)	0.0248 (0.022, 0.026)	0.0491 (0.047, 0.053)
IRON	0.0166 (0.015, 0.019)	0.0038 (-0.002, 0.009)	0.0399 (0.037, 0.042)	0.0127 (0.010, 0.015)	0.0292 (0.023, 0.032)
BCYCLE	-0.1407 (-0.146, -0.134)	-0.0524 (-0.058, -0.049)	-0.2440 (-0.254, -0.236)	-0.1753 (-0.181, -0.170)	-0.0474 (-0.052, -0.042)
MOTORBCYCLE	-0.0240 (-0.026, -0.022)	-0.0056 (-0.009, -0.004)	-0.0335 (-0.038, -0.027)	-0.0331 (-0.037, -0.030)	-0.0018 (-0.004, -0.001)

CAR	0.0121 (0.011, 0.013)	0.0299 (0.028, 0.032)	0.0067 (0.005, 0.008)	0.0139 (0.012, 0.015)	0.0054 (0.004, 0.007)
OWNHOUSE	-0.1362 (-0.140, -0.131)	-0.0283 (-0.031, -0.018)	-0.2328 (-0.244, -0.226)	-0.1540 (-0.158, -0.147)	-0.0892 (-0.095, -0.081)
LANDSIZE	-0.0699 (-0.074, -0.066)	-0.0155 (-0.022, -0.011)	-0.1112 (-0.118, -0.102)	-0.0774 (-0.082, -0.072)	-0.0515 (-0.058, -0.046)
VESSEL	-0.0032 (-0.004, -0.002)	-0.0008 (-0.001, 0.000)	-0.0059 (-0.007, -0.004)	-0.0043 (-0.005, -0.003)	-0.0002 (-0.001, 0.001)
MOBILEPHONE	-0.1404 (-0.143, -0.136)	-0.1318 (-0.137, -0.128)	-0.1599 (-0.168, -0.151)	-0.1530 (-0.156, -0.147)	-0.1048 (-0.113, -0.100)
WATER_1	-0.0294 (-0.032, -0.027)	-0.1041 (-0.109, -0.095)	-0.0051 (-0.008, -0.002)	-0.0170 (-0.020, -0.014)	-0.0618 (-0.069, -0.055)
TOILET_1	0.0303 (0.029, 0.032)	0.0585 (0.054, 0.061)	0.0082 (0.007, 0.009)	0.0295 (0.028, 0.031)	0.0350 (0.033, 0.039)
ELECTCON_1	-0.0271 (-0.031, -0.025)	-0.1124 (-0.117, -0.108)	0.0300 (0.027, 0.034)	-0.01514 (-0.018, -0.013)	-0.0588 (-0.063, -0.050)