By how much did the Malawi Economic Crisis Affect the Welfare of the People? Evidence from Survey Data.

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1 Introduction

Malawi experienced an economic crisis after years of impressive economic growth performance. The crisis began in late 2011 and continued through 2012. Economic performance was dismal: Gross Domestic Product (GDP) growth plummeted from an average growth rate of over 5 percent in the two years preceding the crisis to a negative growth rate of -0.6 percent in 2012. This dismal performance was a result of the contraction in several key sectors of the economy, including manufacturing (-0.9 percent), electricity, gas and water (-0.9 percent), and public administration and defence (-38.4 percent) (National Statistical Office [NSO], 2013).

A new administration undertook a number of reforms in April 2012 to get the economy back on course. The reforms included the devaluation of the local currency by 49 percent and its subsequent floatation and the removal of subsidies on fuel (OECD et al., 2013). These reforms, however, had negative short term effects. Within months, inflation increased by more than 30 percent, food and fuel prices almost doubled (World Food Program [WFP], 2013). This suggests that net food consumers (urban areas) were hit severely by the crisis whilst food producers (rural areas) had some protection. Similarly, the increase in fuel prices was more likely to hit urban areas than rural areas.

In spite of the negative short term effects, the economy started showing signs of recovery in 2013. For example, the liberalisation of the foreign exchange market improved the foreign currency position as well as the import cover. Fuel queues that had become commonplace disappeared and there was an increase in industrial capacity utilisation since companies were now able to import raw materials (OECD et al., 2013). Preliminary estimates indicate that the GDP growth rate rebounded to 6.3 percent in 2013 (NSO, 2013).

Despite the economic recovery that was registered in 2013, just a year after the crisis, it is feared that the crisis has led to increased poverty in Malawi. Several studies have looked at the short term effects of the crisis on the economy. However, the majority of studies and interest has been on the macro level (see e.g Pauw, Dorosh & Mazunda, 2013). Literature that has tried to look at the impact of the crisis on the microlevel is scant. Thus, the aim of this study is to fill this gap in knowledge.

There are different channels through which an economic crisis can affect the well-being of individuals. The channels through which aggregate shocks affect, for instance consumption expenditure, are not easily traced due to income and substitution effects (Ferreira & Schady, 2009). Firstly, wel-

fare effects of a shock that leads to food price increases may either be negative or positive depending on whether households are net consumers or net producers. Increases in the price of consumer goods not offset by increases in incomes lowers the purchasing power of net consumers thereby lowering their well-being whilst net producers experience welfare gains.

Secondly, reduction in economic activity during an economic crisis may affect outcomes of the goods and labour markets. Companies lay off workers which in turn reduces household incomes. This has a knock-on effect of decreasing the market demand of consumer goods which also consequently leads to production cuts in many economic sectors of an economy. Depending on the depth and severity of the crisis, laid off workers may migrate to areas that are not severely hit by the crisis in search for new employment (Tambunan, 2010). Internal migration highlights the important fact that the effects of an economic crisis may not be spread uniformly across a country. The effects may vary among different areas in such a way that some areas are less affected than others depending on where the worst hit sectors of the economy are located.

Thirdly, crises may force governments to introduce expenditure cuts which may lead to the decline in supply or quality of important social services such as health (Firpo & Andre, 2010).

The challenge, therefore, is that there is no theory that explains the direct mechanism through which an aggregate economic shock affects the welfare of individuals. Notwithstanding this shortcoming, Ravallion and Huppi(1991) are of the view that "comparisons of the magnitude and severity of poverty can provide direct evidence of an economy's progress in raising living standards of the poor and throw light on how the poor are affected by specific macroeconomic changes and public policies"(p.57).

Thus, the crucial thing in this instance is the availability of pre and post crisis data that are nationally and sub-nationally representative as well as comparable over time. Fortunately, the econometric tools and data that can enable us make such comparisons are available. For the first time in Malawi, the NSO conducted a panel survey in 2010 and 2013, representing waves one and two, respectively. Thus, the data are uniquely well-suited for the purposes of this study since wave one represents the pre-crisis period whilst wave two represent the post-crisis period.

Against this background, this paper examines the short run effects of the late 2011 through 2012 economic crisis in Malawi on the well-being outcomes of households and individuals. This is achieved by investigating the welfare changes as captured by consumption expenditure between the pre-crisis and post-crisis periods. Given that areas may be affected differently, the analysis is done

at both the national and sub-national levels (rural and urban, and rural areas in the three regions of Malawi: north, centre and south).

Specifically, the study seeks to answer three questions: (1) By how much did the levels of poverty incidence, depth and severity at the national and sub-national levels change between 2010 and 2013? (2) Are these changes insensitive to the choice of poverty line and measure used? (3) How much of the change in aggregate poverty levels in the areas are due to intrasectoral effects and how much are attributable to intersectoral shifts in population?

To understand the changes in welfare between the two periods, we employ the permanent income hypothesis (Friedman, 1957). The implication of this theory is that in the wake of a shock, individuals smooth out consumption. The theoretical section discusses different ways through which households smooth consumption shocks and goes further to discuss why sometimes this may not be the case.

The empirical results indicate that contrary to popular belief, individuals and households weathered the economic crisis. Evidence indicates no statistically significant increases in poverty levels in Malawi during this period. The poverty incidence across areas in Malawi remained at their 2010 levels except for rural-south which experienced a significant decline in the number of poor people in 2013. Stochastic dominance results show that irrespective of the choice of poverty measure and poverty line, there was no significant change in poverty between the two years, save for rural areas in the northern and southern regions of Malawi. These areas actually experienced improvement in welfare, hence a decline in poverty. Broadly, results indicate that within area changes in poverty incidence, depth and severity contributed heavily to the overall change in poverty as opposed to population movements among the areas.

The rest of the paper is structured as follows: Section 2 provides a brief overview of the macroeconomic developments during the crisis period. The theoretical framework used in the paper is the focus of Section 3. Section 4 looks at the methodology employed whilst Section 5 discusses the data used in the study. A detailed discussion of the findings of the study is the focus of Section 6 and Section 7 concludes the paper by highlighting the key findings.

2 Overview of Macro Economic Developments in Malawi

The Malawi economy underwent an economic meltdown beginning late 2011 and continued through 2012. The economic challenges started when Malawi's program with the International Monetary Fund (IMF) was suspended due to unsatisfactory performance. Further, budget support donors[1] withheld their aid because of governance concerns. This resulted in reduced donor budget support and acute foreign exchange shortages exacerbated by sharp declines in tobacco[2] prices. Consequently, the country faced serious challenges in the importation of essential commodities such as medicines, fuel and raw materials for manufacturing among others (OECD et al., 2013).

Further, the currency was overvalued and for months the government refused to devalue it. As a result, a parallel market burgeoned. The spread between the official exchange rate and the secondary market rate reached as high as 100 percent (Pauw, Dorosh & Mazunda, 2013). Pricing of imported goods were based on the parallel market rate and this resulted in high inflation (Diaz-Bonilla, 2015).

A new administration headed by the then Vice President, Joyce Banda, took the reins of power in April 2012 after President Bingu wa Mutharika died of a heart attack and immediately undertook bold macroeconomic policy reforms to address the internal imbalances and reinstall macroeconomic stability (OECD et al., 2013). The reforms included tightening of monetary and fiscal policy, liberalisation of current account transactions and adoption of the automatic tariff adjustment mechanism for utilities and petroleum products to ensure cost-recovery (International Monetary Fund[IMF], 2012). Further, the government re-engaged the IMF which resulted signing of a new program. In addition, donors resumed their budget support to Malawi. The local currency, Malawi Kwacha (MK), was devalued by 49 percent and subsequently floated (OECD et al., 2013). By the end of 2012 it was trading at around MK250 to 1 United States Dollar (USD) from around MK150/USD and MK156/USD in 2010 and 2011, respectively. As expected, inflation surged further to around 21.4 percent at the end of 2012 from 7.4 percent and 7.6 percent in 2010 and 2011, respectively (see figure 1). Official figures indicate that overall GDP growth rate plunged to negative 0.6 percent in 2012 from an average growth rate of 5.9 percent between 2010 and 2011 (see figure 1). This was as a result of contractions in different economic sectors. Contractions were registered in the manufacturing (-0.9 percent), electricity, gas and water (-0.9 percent), and public administration

[1] Up to 40 percent of the national budget has traditionally been supported by donors
[2] Tobacco is Malawi's main cash crop and foreign exchange earner

and defence (-38.4 percent) sectors (NSO, 2013). In contrast, the agriculture, forestry and fishing sector still experienced a marginal positive growth rate of about 1 percent (see table 1).

In addition to the reforms, the government launched the second Malawi Growth and Development Strategy (MGDSII) (2011-2016) whose objectives include poverty reduction through sustainable growth (OECD et al., 2013). To speed up the recovery process, the government also launched an 18-month Economic Recovery Program (ERP) which focused on priority sectors selected from the MGDSII, such as commercial agriculture, infrastructure development and mining (Randall, 2013). Donors increased their aid to Malawi to support and strengthen the recovery process as well as protect the most vulnerable of the population from adverse effects of the reforms.

The economic reforms started bearing fruit from the second half of 2012. For example, the devaluation and subsequent floatation of the kwacha improved the foreign currency position as well as the import cover. There was an increase in industrial capacity utilisation since companies were now able to import raw materials (OECD et al., 2013). Fuel queues disappeared and the parallel market exchange rate premium was substantially reduced (Randall, 2013). GDP growth rate rebounded to 6.3 percent in 2013 (see figure 1).

3 Theoretical Framework

3.1 Permanent Income Hypothesis

Despite decades of poverty analysis, there is no unifying theoretical framework that can be used to predict the temporal patterns of individuals' welfare in the wake of a shock. Part of the challenge is due to the complexity in modelling poverty given that it is multifaceted. Thus, to explain welfare changes over time we have to make use of frameworks that explain household composition, allocation rules, earnings, welfare programs, the workings of the macro economy, empowerment and democracy among others. Several theories that have a bearing on poverty have been used in the literature for instance, the Human Capital Theory (Becker, 1975). However, the focus of these models are on earnings and constitute particularly labour income while ignoring non-labour income sources which are important in underdeveloped economies where the majority of the people are self-employed.

In spite of the unavailability of a unifying framework, there is general consensus that individuals

tend to smooth their consumption over the life cycle. To this end, the Permanent Income Hypothesis (PIH) (Friedman, 1957) is employed to explain the well-being changes when money metric indicators such as consumption and income are used.

The implication of this hypothesis is that faced with fluctuating incomes as a result of a shock, households tend to smooth out their consumption through different ways. Firstly, households may borrow from the formal and informal markets (Fafchamps, Udry & Czukas, 1998) or for those with borrowing constraints draw down on their assets (Deaton, 1991; Lee and Sawada, 2010). Secondly, households may also re-allocate their budgets away from non-food expenditures (Browning & Crossley, 1997). Finally, households may move away from their area of residence to areas that are not badly hit (Rosenzweig, 1988).

Suffice to indicate that empirical evidence of the PIH is mixed. Nevertheless, there is empirical evidence that households do smooth out their consumption over shorter periods of time (Deaton, 1997). For instance, a study by Fafchamps, Udry and Czukas (1998) in Burkina Faso, found that households were selling their cattle in times of drought to smooth out consumption.

The study adopts this theoretical framework to look at poverty changes between 2010 and 2013 in Malawi. The main focus is on the sub-national levels. Since this theory posits that individuals and households smooth their consumption in the wake of a shock, we hypothesise that poverty levels in 2013, on average, remained at their 2010 levels.

3.2 Reasons why the Theory may not hold

There are several reasons as to why we may still observe fluctuations in consumption in the wake of a shock. Firstly, not all households have assets that they can use to cushion themselves from a shock (Paxson & Alderman, 1992). Secondly, credit and insurance markets are not well developed in most developing countries. Thirdly, it is often the case that households have similar assets and when a time comes to dispose of these assets as a means of buffering themselves from a shock, the market is flooded with similar assets. Such a situation will drive asset prices down (Fafchamps & Gavian, 1997). Fourthly, shocks may affect the permanent incomes of households which in turn forces households to re-optimise their consumption decisions (Klasen & Gunther, 2006). Lastly, even though most governments intervene in times of shock to support the most vulnerable of the population in form of food transfers and public works programmes, these may not be enough to mitigate income fluctuations.

4 Methodology

In this section we look at the empirical methods and the welfare indicator employed in the study. The methodology is broken down into subsections. The first subsection discusses the welfare indicator. The poverty line used is then described followed by a discussion of the poverty indices employed. A discussion of stochastic dominance tests is then made. Finally, the decomposition methodology used in the paper is discussed.

Measuring poverty requires three steps: (1) defining the well-being indicator(s), (2) establishing a minimum acceptable threshold which separates the poor from the non-poor ("the poverty line"), and (3) selecting the measure from which poverty summary statistics are generated (Cowell, 2003; Haughton & Khandker, 2009).

4.1 Well-being Indicator

As a starting point, the choice of the well being indicator used in this paper is discussed. The choice of the indicator is informed by both theoretical, practical considerations as well as the common practice in Malawi. Literature on poverty is fraught with studies using income or consumption to capture people's well-being. In less developed countries, consumption expenditure is easier to estimate than income largely because most of the incomes come from self employment which is difficult to measure (Haughton & Khandker, 2009). Theoretically, consumption expenditure unlike income, gives a better picture of individuals' welfare since incomes are under-reported in surveys (Meyer, Mok & Sullivan, 2009). Moreover, current literature in Malawi employs consumption expenditure as a measure of welfare (see e.g Mukherjee & Benson, 2003; Mussa, 2013). However, it should be noted at the outset that the approach of using either expenditure or income as a measure of welfare is narrow in the sense that an individual's well-being is multidimensional. Other aspects like freedom of speech and empowerment are important as well (Sen, 1985). Nevertheless, Ravallion rightly argues that:

> if one chooses not to form the composite at a household level but to look instead at the separate dimensions of poverty then one is in a better position to span the relevant dimensions and to choose the best available data on each. (2011, p.238).

Further, in the study we use per capita consumption expenditure. It should be pointed out

nonetheless that using per capita consumption expenditure as a measure of well-being is not without its limitations. It does not capture household heterogeneity. In particular, it assumes that the consumption needs of children are the same as those of adults. In addition, it assumes away economies of scale that emanate from the fact that some goods and services in the household have public good characteristics (e.g sharing of bathrooms, lighting etc). The literature deals with this problem by employing consumption/income per adult equivalent as a measure of well-being (see e.g van Praag & Warnaar, 1997). However, Deaton (1997) notes that construction of these deflators is non trivial. Given the complexity and arbitrariness in the construction of the adult equivalents and the current practice in Malawi, in this paper these scales will not be used.

4.2 Defining a Poverty Line

This subsection presents the poverty line used in the paper. In the literature two classes of poverty lines are employed namely "absolute" and "relative." The former is fixed across space and time whilst the latter rises with mean expenditure. Ravallion (1998) argues for the use of an absolute poverty line because it "guarantees that the poverty comparisons made are consistent in the sense that two individuals with the same level of welfare are treated the same way" (p.5). The National Statistical Office (NSO) of Malawi employs the "Basic Needs Approach" in coming up with poverty lines.[3]

This paper adopts the official annual absolute poverty line of MK85,852 (NSO, 2014), which is a sum of two main components namely, food (MK53,262) and non-food (MK32,589). This poverty line was arrived at by inflating the 2010 poverty line (i.e MK37,002) by 132 percent to reflect the higher cost of living in 2013 (NSO, 2014).

4.3 Measures of Poverty

The study employs the Foster-Greer-Thorbecke (FGT) class of poverty indices (Foster, Greer & Thorbecke, 1984). These indices are characterised by different sensitivities to various axiomatic properties used to define a good welfare measure.[4] Although there are other measures of poverty which satisfy the axioms of a good welfare measure, the FGT measures have an important characteristic of being decomposable into sub-groups. This feature, allows us to disaggregate overall

[3]See Ravallion and Bidani (1994), for a discussion of the approach.
[4]See Zheng (1997), for an in depth discussion of the axioms.

poverty by sub-groups. The FGT measures are defined as:

$$P(z,\alpha) = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{z-y_i}{z}\right)^{\alpha} I(y_i < z) \tag{1}$$

Where y_i is the per capita consumption expenditure of each individual i, N is the total population, z is a poverty line, α is a measure of the weight placed on the poorest individuals with higher values representing greater weight. $I(\cdot)$ is an indicator function equal to 1 if the argument $y_i < z$ holds, and 0 otherwise. Setting $\alpha = 0$, yields the popular poverty headcount ratio which gives the fraction of the population who are poor. Although this index is widely used, it only tells us how many people are poor but does not tell us how poor they are. Despite this shortcoming, it is very intuitive in a sense that we easily grasp the idea of poverty when we read that a certain percentage of population lives below a given poverty line. Setting $\alpha = 1$ yields the poverty gap ratio which measures the minimum cost of eliminating poverty. It, thus, measures the depth of poverty but does not indicate the severity of poverty. With $\alpha = 2$ we get the poverty severity index which gives the greatest weight to the poorest of the poor. Thus, we chose the FGT class since it nests all these measures and by increasing the value of α, we can concentrate on the poorest.

Equation 1 is normalised by a poverty line which renders the measure free of currency.

4.4 Stochastic Dominance Tests

A study of poverty cannot be complete without robustness tests (Haughton & Khandker, 2009). Poverty estimates may be sensitive to the poverty line and the measure used. In this regard, it is imperative to check whether we can make general welfare statements independent of the chosen poverty line and measure. To that end, we conduct dominance tests. We adopt the procedure by Davidson and Duclos (2000). In what follows, we discuss the procedure.

Consider two distributions of per capita consumption expenditure with cumulative density functions (CDFs) corresponding to the two periods under study, F_{2010} and F_{2013}, defined in $\mathbb{R}_+$ (non-negative real numbers). F_{2010} is a CDF for one group in 2010, and F_{2013} is a CDF for the same group in 2013. Let

$$D^1_{2010}(x) = F_{2010}(x) = \int_0^x dF_{2010}(y) \tag{2}$$

If $D^1_{2013}(x) \leq (<) D^1_{2010}(x)$ for all $x \in \mathbb{R}_+$ (i.e F_{2013} is everywhere to the right of F_{2010}), then distribution for 2013 is said to (strictly) first order stochastically dominate distribution for 2010 for all $x \in [0, z_{max}]$, where z_{max} is the maximum acceptable poverty line. This implies that the welfare distribution for 2013 is better than the welfare distribution for 2010 up to the chosen poverty line and if this is true for all possible poverty lines, then we can generally conclude that the 2013 distribution is preferable to the 2010 distribution. Since $D^1_{2013}(x)$ is also the poverty headcount ratio (P_0) for 2013, it implies that poverty headcount is lower for 2013 than 2010 irrespective of the chosen poverty line. However, if the two welfare distributions cross within the relevant range of poverty lines, then first order dominance fails and different poverty lines and measures will produce different orderings of the distributions. In such instances, we can still make welfare statements by resorting to higher order dominance tests. In general, equation 2 is given by:

$$D^s_{2010}(x) = \int_0^x D^{s-1}_{2010}(y)\, dy \tag{3}$$

Where s represent the order of dominance. In general, for any integer $s \geq 2$, 2013 welfare distribution is said to (strictly) dominate welfare distribution for 2010 at older s if $D^s_{2013}(x) \leq (<) D^s_{2010}(x)$. With this formulation, it can be seen that second order dominance (i.e $s = 2$) implies that the poverty gap (P_1) is less for 2013 welfare distribution than for 2010 welfare distribution for all possible poverty lines. A corresponding relationship holds between third order dominance (i.e $s = 3$) and the poverty severity index (P_2). These relationships will become transparent in the proceeding discussion.

Davidson and Duclos (2000), show that an estimator of $D^s(x)$ of a sample of N independent observations of the living standard indicator y_i, from a population is:

$$\begin{aligned} \hat{D}^s(x) =& \frac{1}{(s-1)!} \int_0^x (x-y)^{s-1}\, d\hat{F}(y) \\ =& \frac{1}{N(s-1)!} \sum_{i=1}^{N} (x-y_i)^{s-1}\, I(y_i \leq x) \end{aligned} \tag{4}$$

Where $I(\cdot)$ is an indicator function as explained earlier and $\hat{F}$ is the empirical CDF of the

sample. It can be seen that there is a similarity between this estimator and the FGT measures described above.

Student t-tests are used to test the difference between the two CDF's corresponding to the two years under study. Specifically, the null hypothesis of non-dominance is tested against the alternative hypothesis of dominance.[5] In keeping with the practice in a number of studies (see e.g Mussa, 2013; Sahn & Stifel, 2002), up to $s = 3$ is tested.

4.5 Sectoral Decomposition of Poverty

Given the desirable decomposability characteristic of the FGT indices, we conduct a sectoral decomposition of poverty changes between the two years under study. The purpose of this decomposition is to narrow down what share of aggregate poverty changes can be attributed to intrasectoral shift effects as opposed to demographics effects. The most widely used sectoral decomposition approach in the literature is presented by Ravallion and Huppi (1991).

We adopt the approach to decompose the change in poverty in Malawi in 2010 and 2013 by rural and urban, and the rural areas in the regions of Malawi: north, centre and south. These three administrative regions of Malawi differ in a number of aspects. The southern region is densely populated and is home to the commercial city (Blantyre) and the old capital city (Zomba). Most of the households in the rural areas of this region engage in subsistence food crop production and are thus net food producers. The central region is home to the capital city (Lilongwe) and has fertile plains. There is a mixture of subsistence and commercial agriculture in the rural areas of this region. Tobacco is mainly grown in this region and rural households are net food consumers. The northern region is mountainous and sparsely populated. It has the lowest economic activity of all the regions and most of the rural households engage in food production (i.e net food producers).

The change in aggregate poverty between the two years can be decomposed into intrasectoral effect or within group effect, population shifts effect or demographic effect, and interaction effect as follows (Duclos & Araar, 2006):

[5] $H_0 : \hat{D}^s_{2013}(x) - \hat{D}^s_{2010}(x) = 0$ against $H_1 : \hat{D}^s_{2013}(x) - \hat{D}^s_{2010}(x) > 0$.

$$
\begin{aligned}
&P_{2013}(z;\alpha) - P_{2010}(z;\alpha) = \\
&\sum_k^K \underbrace{\phi_{2010}(k)(P_{2013}(k;z;\alpha) - P_{2010}(k;z;\alpha))}_{\text{within-group poverty effects}} \\
&+ \sum_k^K \underbrace{P_{2010}(k;z;\alpha)(\phi_{2013}(k) - \phi_{2010}(k))}_{\text{demographic or sectoral effects}} \\
&+ \underbrace{\sum_k^K (P_{2013}(k;z;\alpha) - P_{2010}(k;z;\alpha)(\phi_{2013}(k) - \phi_{2010}(k)))}_{\text{Interaction or error term}}
\end{aligned} \tag{5}
$$

Where k is the sector (i.e. rural and urban or the rural areas in the three regions of Malawi), $\phi_{2010}(k)$ or $\phi_{2013}(k)$ is the population share of sector k for 2010 or 2013.

The within group poverty effects or intra-sectoral effects represent the change in poverty that is due to changes in poverty rates whilst not allowing for a sector's population share to change (i.e remain at 2010 level). The demographic effects represent the change in poverty that is due to changes in population shares in each sector whilst freezing the poverty level within a sector. The last term, the error term, represents the change in poverty arising from changes in both poverty levels and population shares.

The above sectoral decomposition suffers from two problems. Firstly, it is sensitive to the choice of weights. In order to estimate the within-group poverty effects, one can either use $\phi_{2013}(k)$ or $\phi_{2010}(k)$. However, the conclusions may be different. Secondly, the methodology generates an error term (interaction effect), which may be problematic to interpret. To deal with these two problems, we use the Shapley value approach. This approach deals with the first problem by weighting the intrasectoral shift effects by the average population shares, and weighting the demographic by the average poverty index. Then the interaction term is purged out by averaging the results acquired from using the both initial (2010) and terminal(2013) periods as base periods (Duclos & Araar, 2006).

5 Data

For the first time in Malawi, the NSO conducted a panel survey in the form of the Integrated Household Panel Survey (IHPS). The IHPS was conducted as part of the bigger Integrated Household Survey Programme employed quinquennially. It is representative at both the national as well as sub-national levels and designed to provide data on different dimensions of household well-being. Wave one of the panel comprises 3,246 households interviewed from March to November 2010 selected from the bigger 2010/11 Integrated Household Survey (IHS3) sample. 204 (enumeration areas) EAs out of 768 EAs in IHS3 were selected to be resurveyed in 2013. The IHPS endeavoured to follow baseline households and individuals that split-off from their baseline dwellings on conditions that they were:(1) neither servants nor guests at the baseline; (2) estimated to be at least 12 years of age; and excluded those that were in institutions such as army barracks (NSO, 2014).

Wave two of the panel was conducted between April and December 2013 and involved resurveying households and individuals that were pre-selected in the baseline. The new households that the individuals formed or joined after 2010 were also brought into the IHPS sample. Thus, the wave two sample grew to 4,000 households (NSO, 2014).

The fact that these data were collected before and after the 2012 economic crisis makes the data set unique for analysing the effects of crisis on the poor.

5.1 Consumption Aggregates

The consumption aggregate for each wave constitutes four expenditure parts, namely food, non-food, durable goods and housing. In coming up with the consumption aggregates, the NSO was guided by theoretical and practical considerations. We briefly discuss how the components were computed.[6]

To generate total food consumption, all possible sources of consumption were included such purchased food, home-produced food gifts. Non-purchased food items were valued and included in the aggregate. Missing consumption values were imputed using median unit values computed at several levels, including cluster, urban and rural areas, among others.

The non-food component included expenses on public transport, mobile phones, personal care and clothing, among others. Some non-food items were not included in the aggregate, including

[6] see NSO (2014).

mortgages or debt payments since they constitute financial transactions and not consumption. Lumpy expenditures such expenditures on marriages, births and funerals were taken out since they are sporadic in nature, often large amounts and can overestimate the true level of household welfare.

Durable goods provide a stream of utility over time rather than being consumed in one go. Even though the flow of utility derived from these goods is unobservable, it can be assumed to be a fraction of the value of the good. A number of steps were used to estimate this component. Firstly, purchases of these durable goods were assumed to be uniformly distributed over time. This assumption allows the estimation of the average lifetime of each durable good as twice the average age of the goods reported in the survey. Secondly, the remaining lifetime was calculated as the current age minus the expected lifetime. If the current age of the durable good exceeded the expected lifetime, the remaining lifetime was replaced by two years. Finally, the annual use value of each durable good is calculated as the current value divided by the remaining lifetime.

To estimate housing costs, hedonic rental regressions were estimated for each wave with rent (actual or self-reported) as the dependent variable and a set of independent variables that included the type of walls, roof and floor, the number of rooms, the main source of drinking water and sanitation, access to electricity, the geographical location of the household (district and urban or rural area) and the month of the interview. The predicted rent from these regressions were used to impute the value of housing for those households that reported an unreasonable rent or that did not report any rent at all in each wave.

To allow for price differentials across space (different areas face different prices) and time (data were collected through out the year), the NSO adjusted each sample using the Consumer Price Index (CPI). Similarly, all consumption Malawi Kwacha (MK) values are in 2013 prices (2010 values were inflated by 132 percent) thus allowing for temporal comparisons.

5.2 Attrition Rates

Over time, panel samples shrink which may lead to attrition bias (Haughton & Khandker, 2009). The reasons for dwindling numbers may include death, tracking problems and non response. Thus before any analysis it important to investigate attrition.

As indicated the second wave ended up with 4000 surveyed households and can be mapped back to 3,104 households in 2010. Out of these 3,104 baseline households, 76.80 percent remained in their 2010 dwellings, 18.49 percent and 4.70 percent split off into two and at least three households,

respectively. Further, 20 baseline households passed on between the two years. This translates into a household level attrition rate of 3.78 percent. At the individual level, 3,246 households in 2010 contained 15,597 members, of whom 296 passed on between the two years. This implies that 15,301 remained of whom 14,165 individuals in 2010 were accounted for by wave two. This represents an attrition rate of only 7.42 percent at the individual level (NSO, 2014). Therefore, by the standards of most panels, the IHPS has low annualised attrition rate.

Wave two has several questionnaires, including a household questionnaire which is similar to the one employed in wave one. Therefore, the panel data allow for comparable measures of well-being at the household and individual levels in 2010 and 2013. The questionnaire covers several areas, including economic activities and welfare. It covers a wide range of topics, including consumption expenditure, cash and non-cash income and savings.[7]

6 Results

This section discusses the empirical findings of the study. The two samples are stratified. Each selected household has an associated weight indicating the inverse probability of selection.[8] The analysis is implemented in Stata version 14 using the Distributive Analysis Data Package (DASP) (Araar & Duclos, 2007). This package allows for complex survey designs in the analysis of our estimates.

6.1 A Visual Look at Changes in Per Capita Consumption Expenditures

This segment discusses the paper's results by looking at kernel density curves of consumption. Figure 2 displays the density curves at both the national and sub-national levels for the two years. We can see that the two density curves for Malawi (panel (a)) in 2013 largely coincide. This suggests little change in welfare which translates into no changes in poverty. Kernel density curves for rural areas (panel (b)) show a slight shift to the right suggesting an increase in welfare in 2013 as compared to 2010. In contrast, density curves for urban (panel (c)) show the worsening of welfare in 2013 (shift to the left). Looking at rural areas in Malawi, density curves for rural north and rural south (panels (d) and (e), respectively) indicate an increase in welfare in 2013 whilst those for rural

[7] See NSO (2014), for detailed information on the IHPS

[8] Calculated by multiplying the probabilities at each sampling stage.

centre (panel (f)) largely coincide indicating that there were no changes in welfare between the two years.

6.2 Poverty Measures

The results of poverty measures (incidence, depth and severity) for the two periods under study are examined below.

Table 2 presents the results of poverty incidence. The results show a short run mixed picture of the impact of the crisis on individual's welfare. At the national level, the results show that 40.2 percent and 37.5 percent of the population were poor in 2010 and 2013, respectively. This represents a decline in poverty incidence by 7 percent. Urban areas experienced an increase in the incidence of poverty during this period (from 17.5 percent in 2010 to 25.1 percent in 2013) as opposed to rural areas which saw a decrease in the number of poor people (from 44.3 percent to 40 percent). This is consistent with the picture that we had above. As noted before, the increase in poverty incidence in urban areas can be attributed to the fact that the crisis mainly affected urban areas (i.e net food consumers and heavy users of fuel). Results of the poverty incidence in the rural areas among the regions indicate that the proportion of poor people decreased in rural-north by 18 percent, increased in rural-centre by 11 percent and decreased by 21 percent in rural-south. A possible explanation for the increase in poverty in the rural-centre is that households mainly engage in the production of cash crops in particular tobacco as compared to rural-north and rural-south which engage in the production of food crops. Tobacco income is a key component of household income for households in the rural-centre and prices of tobacco had not fully recovered from the sharp decreases of 2012. Thus, rural-south and rural-north households were able to cushion themselves from adverse effects of food price increases. Overall, the results indicate relatively large changes in poverty incidence between the two years. However, none of the changes are statistically significant except for the rural-south change which is significant at the 0.10 significance level.

Table 3 represents poverty depth and severity results. They show a modest decrease in the depth and severity of poverty between the two waves. Poverty depth decreased by 17 percent at the national level. Urban areas became relatively poorer than rural areas. Rural areas are still poorer than urban areas. However, the gap narrowed over the two waves since urban areas worsened while rural areas improved by a significant amount. Rural-north and rural- south improved whilst rural-centre worsened. All the changes are statistically significant at the conventional levels, save

for rural centre and urban areas. Looking at poverty severity, the results indicate a similar pattern to poverty depth results. Across Malawi, poverty severity declined in all areas under study and the results are statistically significant except for urban and rural-centre which experienced an increase in poverty though not statistically significant.

6.3 Stochastic Dominance

In this subsection, we report statistical dominance test results of the poverty results. The analysis will inform us on whether we can make general welfare statements about the results independent of the poverty line or measures used.

We start by looking at the poverty incidence curves for Malawi presented by figure 3. The two curves cannot be conclusively ranked against each other such that different poverty lines will give different results. For instance, the vertical line on the left captures the poverty line used in the study (MK85,852). Up to this poverty line the distribution for 2013 is everywhere to the right of the 2010 distribution implying that poverty incidence declined in 2013. However, picking another poverty line such as the one on the right we see no change in poverty between the two periods (the two distributions overlap).

As noted above, when two distributions overlap or intersect over some range we need further information to have a conclusive result. This calls for higher order dominance tests. In line with the earlier statement, this study considers dominance up to order three. Table 4 presents dominance results. We see that there is no significant change in poverty between 2010 and 2013 except for rural areas in the southern and northern regions of Malawi which actually experienced reduction in poverty. This suggests that households were resilient and were able to smooth their consumption levels in Malawi.

6.4 Sectoral Decomposition of changes in Poverty

We now discuss results of the sectoral decomposition of poverty into intrasectoral and population shift effects presented in tables 5 and 6 derived from equation 5.

Note that since we employed the Shapley value approach, the interaction effect vanishes. Table 5 gives rural-urban sectoral decomposition results. The results show that of the total reduction in the poverty incidence in this period, over 137 percent is attributable to reduction in within rural

poverty, 46 percent to urban poverty increase and 7 percent to urbanisation. Losses to the urban sector and population shifts from rural to urban were quantitatively less than the direct gains to the rural poor. Migration [9] to urban areas is rather odd considering that it was worst hit by the crisis. Perhaps this is deeply rooted in the belief that urban areas have better economic opportunities as compared to rural areas. Results for the depth and severity indicate a similar trend that their changes are largely due to changes in within rural and urban poverty as opposed to population shift effects. In all cases, rural-area changes contribute heavily to the overall total change. This is largely due to the sheer share of national poverty accounted by this sector.

Table 6 shows results of the sectoral decomposition of rural areas in the three regions of Malawi: north, centre and south. Total decline in poverty incidence is mainly due to within reduction in poverty as opposed population shift effects (about 15 percent). Note that the population shift effect here is more than that of the rural-urban sectoral decomposition. This result is expected since as noted before rural-south and rural-north weathered the effects of the shock. The biggest contributor to the poverty change is rural-south amounting to about 98 percent. This impressive contribution is largely due to the significant decline in the poverty incidence attributed to this sector. Rural-north comes second at about 22 percent and is followed by rural-centre at -35 percent. Note that the improvement in welfare in rural areas is dampened by the welfare losses to rural-centre. Results of the depth and severity of poverty indicate that population shift effects are relatively higher compared to the ones from poverty incidence. However, within poverty changes remain the biggest driver of the poverty changes as compared to population movements among the rural areas in the regions.

7 Concluding Remarks

This paper using the 2010 and 2013 Integrated Household Panel Survey, has investigated the impact of the late 2011 through 2012 Malawi economic crisis on the well-being individuals. Using annual per capita consumption expenditure as an indicator of welfare, the focus was on the change in poverty incidence, depth and severity between 2010 and 2013 at both the national and sub-national levels (rural-urban, and rural areas in the northern, central and southern regions of Malawi). It

[9]Note that the increase in urban population share may be due to other reasons such as differences in mortality and fertility between urban and rural areas. However, average household size in both urban and rural areas only marginally increased between the two years (NSO, 2014). Thus, attributing the increase in population share in urban areas to migration seems plausible.

moved from this "aggregate" approach and analysed how sectoral effects and populations shifts contributed to aggregate changes poverty.

The empirical evidence suggests that households and individuals weathered the adverse effects of the crisis. There was no significant decline in the standard of living across Malawi. In fact, results show that rural-south experienced a significant decline in the number of poor people in 2013. There was a significant decline in the depth and severity of poverty across Malawi over the two periods.

Stochastic dominance results show that irrespective of the choice of poverty measure and poverty line used, there was no significant change in poverty between the two years, save for rural areas in the northern and southern regions of Malawi. These areas actually experienced improvement in welfare, hence a decline in poverty. Rural-urban sectoral decomposition results indicate that within rural poverty incidence reduction(138 percent) was the biggest contributor to the poverty change as opposed to both within urban (-45 percent) changes as well population movement effects (7 percent). Poverty depth and severity decomposition show the relative importance of migration. However, overall results indicate that within rural decreases in poverty incidence, depth and severity contributed heavily to the poverty reduction. Sectoral decompositions of the contributions of rural areas in the regions indicate a similar trend that of within rural area contributing heavily to the poverty change as opposed to population shift effects. The study has shown that the significant decrease in rural-south poverty incidence, depth and severity that was the biggest contributor to the overall change as opposed to populations movements among the rural areas.

One important aspect that future studies may dwell on is the long term impact of the crisis on individuals given that households were able to smooth their consumptions. Households may have engaged in risky coping mechanisms that may have long term welfare effects.

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Table 1: GDP (Value Added) Growth Rates by Sector 2010-2013

Item Description	**2010**	**2011**	**2012****	**2013****
Agriculture, forestry and fishing	6.8	4.3	1	6.2
Mining and quarrying	23.9	1.4	5.3	6.9
Manufacturing	11.4	1.4	-0.9	5.6
Electricity, gas and water	2.9	6	-0.9	5.5
Construction	-2.4	2.3	0.7	2
Wholesale and retail trade	1.9	3.7	0.9	7.9
Transportation and storage	7	2.3	4.2	5.3
Financial and insurance activities	12.7	7.1	8.2	3.8
Public administration and defence	8.9	80.2	-38.4	2.7
Human health and social work activities	11.7	6	1.9	5.1

Note: ** Preliminary figures. All figures are in 2010 prices.
Source: Author's compilations based on NSO data.

Table 2: Trends in Poverty Incidence in Malawi, 2010 and 2013

INCIDENCE (P_0)				
Sector	2010	2013	t-statistic for the difference	percentage change
National	40.210	37.520	1.055	6.690
	(0.0174)	(0.0168)		
Urban	17.460	25.140	-1.215	-43.986
	(0.0459)	(0.0422)		
Rural	44.300	39.900	1.569	9.932
	(0.019)	(0.018)		
Rural North	52.200	42.900	1.608	17.816
	(0.036)	(0.039)		
Rural Centre	35.510	39.350	-0.975	-10.814
	(0.0299)	(0.0281)		
Rural South	50.300	39.800	2.419*	20.875
	(0.033)	(0.028)		

Note: Estimates are in percentage.The significance asterisks are defined as follows: *p<0.10, **p<0.05, *** p<0.01. Numbers in parentheses are standard errors.
Source: Author's calculations based on IHPS data.

Table 3: Trends in Poverty Depth and Severity in Malawi, 2010 and 2013

DEPTH (P_1)				
Sector	2010	2013	t-statistic for the difference	percentage change
National	12.950	10.750	2.031*	16.988
	(0.0087)	(0.0063)		
Urban	4.380	6.940	-1.265	-58.447
	(0.0118)	(0.0164)		
Rural	14.500	11.500	2.444*	20.690
	(0.01)	(0.007)		
Rural North	17.400	13.400	1.879**	22.989
	(0.015)	(0.015)		
Rural Centre	10.500	10.950	-0.277	-4.286
	(0.0138)	(0.0095)		
Rural South	17.400	11.600	2.648***	33.333
	(0.019)	(0.012)		
SEVERITY (P_2)				
Malawi	5.810	4.390	2.305*	24.441
	(0.0052)	(0.0033)		
urban	1.480	2.730	-1.411	-84.459
	(0.0044)	(0.0077)		
Rural	6.600	4.700	2.662***	28.788
	(0.006)	(0.004)		
Rural North	7.800	5.800	1.757**	25.641
	(0.008)	(0.008)		
Rural Centre	4.430	4.430	-0.010	0.000
	(0.0075)	(0.005)		
Rural South	8.300	4.800	2.717***	42.169
	(0.011)	(0.006)		

Note: Estimates are in percentage. The significance asterisks are defined as follows: *p<0.10, **p<0.05, *** p<0.01. Numbers in parentheses are standard errors.
Source: Author's calculations based on IHPS data.

Table 4: Stochastic Dominance Tests

Sector pair	First order	Second order	Third order
Malawi10 vs.Malawi13	ND	ND	ND
Urban10 vs. Urban13	ND	ND	ND
Rural10 vs. Rural13	ND	ND	ND
North rural10 vs. North rural13	ND	+2	
Centre rural10 vs. Centre rural13	ND	ND	ND
South rural10 vs. South rural 13	ND	+2	

Note:(+) indicates that welfare distribution for 2013 dominates welfare distribution for 2010. 2 represents second order dominance. ND: no dominance.
Source: Author's calculations based on IHPS data.

Table 5: Urban-Rural Decomposition of Poverty in Malawi, 2010 and 2013

	INCIDENCE (P_0)	DEPTH (P_1)	SEVERITY (P_2)
Within rural	137.80	100.92	101.98
Within urban	-44.55	-6.08	-7.58
Population shift	6.75	5.16	5.59
TOTAL CHANGE	100.00	100.00	100.00

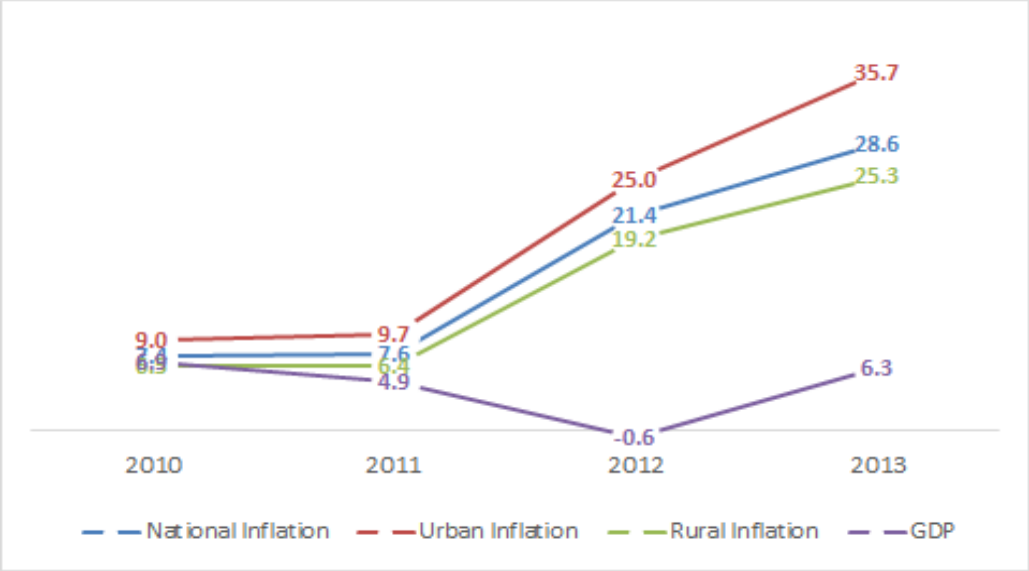
Note:Numbers are in percentage.
Source: Author's calculations based on IHPS data.

Table 6: Rural-in-Regions Decomposition of Poverty in Malawi, 2010 and 2013

	INCIDENCE (P_0)	DEPTH (P_1)	SEVERITY (P_2)
Within rural north	22.09	5.12	5.01
Within rural centre	-34.75	12.80	12.84
Within rural south	97.90	49.15	58.88
Population shift	14.76	32.94	23.27
TOTAL CHANGE	100.00	100.00	100.00

Note:Numbers are in percentage.
Source: Author's calculations based on IHPS data.

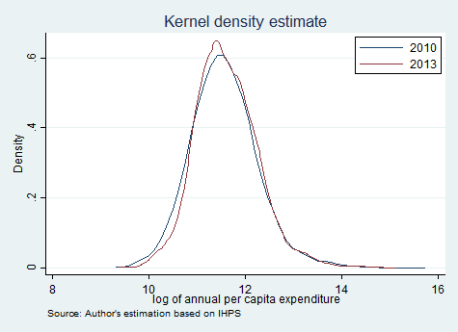
Figure 1: Evolution of Key Macro Aggregates Between 2006 and 2013



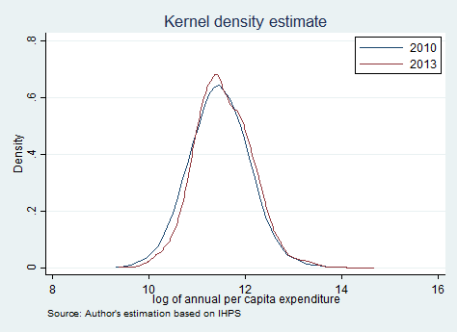
Source: Author's estimations based on NSO and World Bank data

Figure 2: Kernel Densities of Log of Per Capita Consumption Expenditure Across Malawi

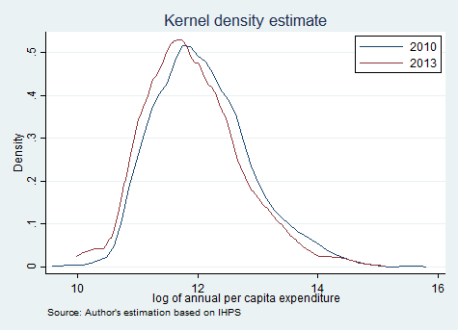
(a) Malawi



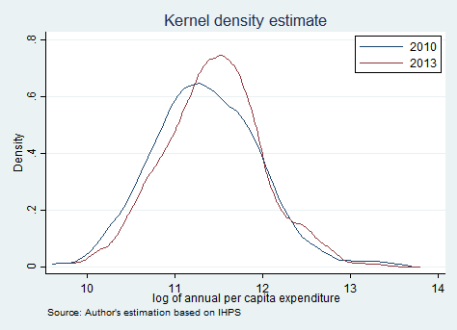
(b) Rural



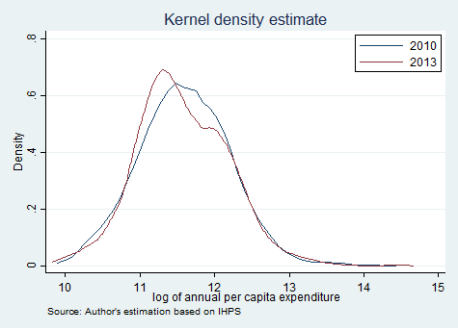
(c) Urban



(d) Rural North



(e) Rural Centre



(f) Rural South

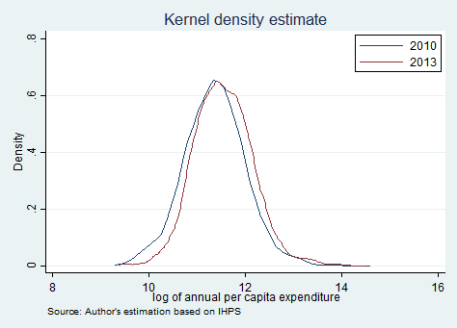
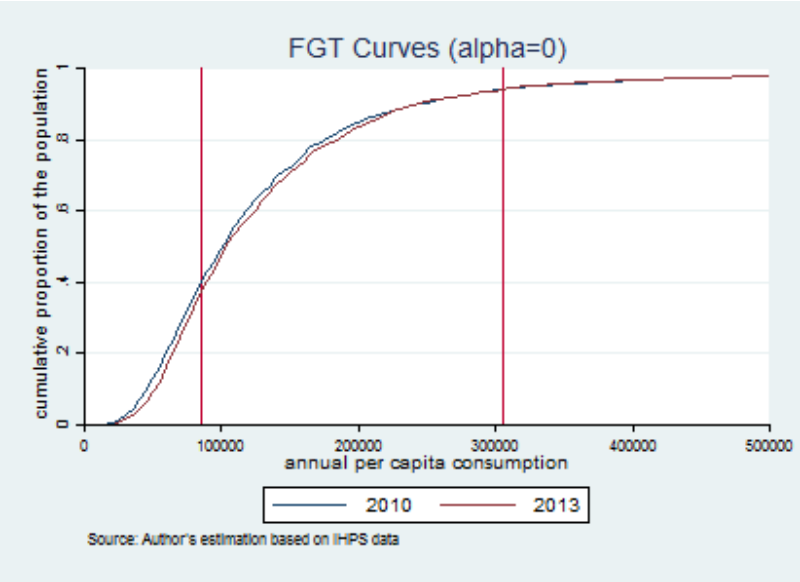


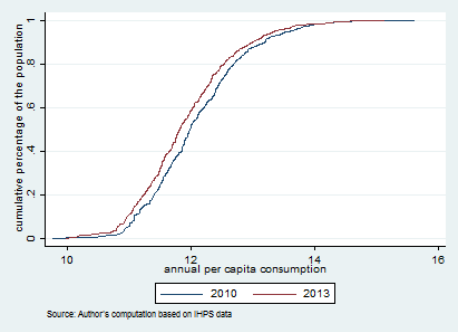
Figure 3: Poverty Incidence Curves for Malawi



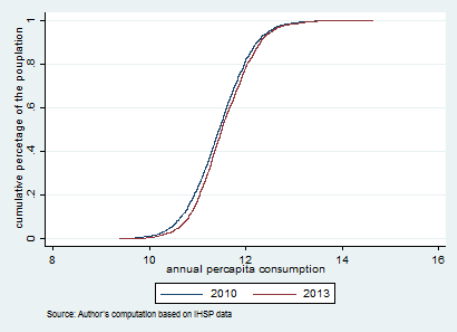
8 Appendix

Figure 4: Sub-National Poverty Incidence Curves for Malawi

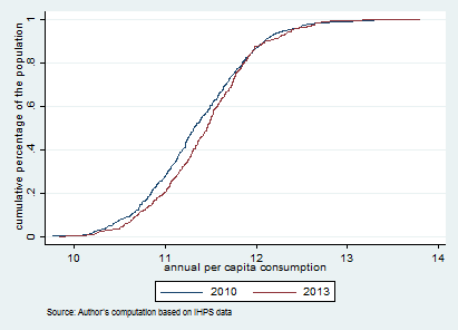
(a) Urban



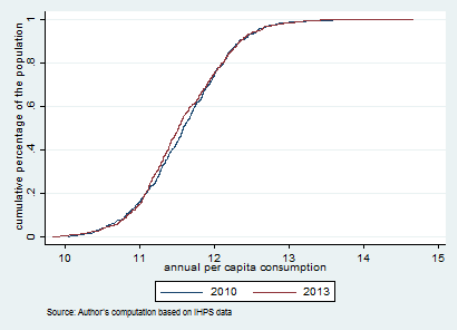
(b) Rural



(c) Rural North



(d) Rural Centre



(e) Rural South