

Methodology for poverty analysis in Malawi in 2010-2013

The Integrated Household Panel Survey (IHPS) is a multi-topic panel survey with a strong focus on agriculture that is implemented by the National Statistical Office (NSO) of Malawi. The first round of the panel comprises 3,246 households interviewed from March to November 2010 as part of the larger 2010/11 Integrated Household Survey (IHS3). The second round has a sample of 4,000 households interviewed between April and December 2013. The IHPS data are representative at the national, urban/rural and regional levels. The panel data allow for comparable measures of household food and non-food consumption, caloric intake, dietary diversity, and objective and subjective measures of food security at the household-level in 2010 and 2013.

Poverty analysis requires three main elements. The first component is a welfare indicator to rank all population from the person with the lowest level of welfare to the person with the highest level of welfare. The second element is an appropriate poverty line to be compared against the welfare indicator in order to classify individuals as poor or non-poor. Last, a set of measures that combine the individual welfare indicators and the poverty line into an aggregate poverty figure. The methodology replicates as much as possible that employed in the poverty analysis of the 2004/05 IHS2 and the 2010/11 IHS3.¹ Two changes are introduced however for the analysis of the panel: the use of new food conversion factors to transform non-standard measurement units into kilograms and the estimation of new price indices to adjust nominal consumption for cost of living differences within each round.²

This note explains all the steps involved in the construction of the consumption aggregate, the derivation of the poverty line and the estimation of the poverty measures.³ Section 1 explains the construction of the consumption aggregate and comprises three subsections. Subsection 1.1 describes the estimation of the nominal consumption of the household. Subsection 1.2 discusses the adjustment for cost of living differences both within and across rounds. Subsection 1.3 refers to the adjustment for differences in demographic composition and size across households. Section 2 clarifies the derivation of the poverty line. Section 3 examines the poverty measures used in this report. Section 4 presents the poverty results and the robustness checks.

1 The welfare indicator

Research on poverty over the last years has reached some consensus on using economic measures of living standards, hence these are regularly employed on poverty analysis. Although they do not cover all aspects of human welfare, they do capture a central component of any assessment of living standards. Common practice is to choose consumption as the preferred welfare indicator because it is likely to be a more useful and accurate measure of living standards than income.

1.1 The construction of the consumption aggregate

¹ See National Statistical Office (2005) and National Statistical Office (2012).

² These two changes imply that the consumption and poverty status of the 2010 panel households in this analysis differ from their consumption and poverty status in the 2010/11 IHS3 analysis.

³ See Deaton and Zaidi (2002) and Houghton and Khandker (2009).

Creating the consumption aggregate is guided by theoretical and practical considerations. First, it must be as comprehensive as possible given the available information. Omitting some components assumes that they do not contribute to people's welfare or that they do not affect the ranking of individuals. Second, market and non-market transactions are to be included, which means that purchases are not the sole component of consumption. Third, expenditure is not consumption. For perishable goods, mostly food, it is usual to assume that all purchases are consumed. But for other goods and services, such as housing or durable goods, corrections have to be made. Fourth, a common reference period should be chosen. Each consumption module in the survey has a different reference period, for instance, for food is the last week, for clothing is the last three months and for education is the last twelve months. All components are converted into annual figures, thus consumption will be reported per year. Last, consistency checks are applied to all consumption components in order to avoid including extreme amounts. A combination of graphical and automated procedures is used to identify amounts considered as outliers, which then are replaced by median values at the cluster level. In case not enough observations at the cluster level are available, median values from districts, from urban and rural areas, or from the entire country are used.

The consumption aggregate comprises four main components: food, non-food, durable goods and housing. A brief discussion on how each component is calculated is outlined below.⁴

1.1.1 Food component

The food component can be constructed by adding up the consumption of all food items in the household, previously normalized to a uniform reference period. The IHS3 and the IHPS record information on food consumption at the household level using the last seven days as the recall period. The survey collects data on 124 items, which are organized in eleven categories: cereals, grains and cereals products; roots, tubers and plantains; nuts and pulses; vegetables; meat, fish and animal products; fruits; cooked food from vendors; milk and milk products; sugar, fats and oil; beverages; and spices and miscellaneous.

A few general principles are applied in the construction of this component. First, only food that was actually consumed, as opposed to total food purchases or total food produced at home, is included in the consumption aggregate. Second, all possible sources of consumption are taken into account. This means that the food component comprises not only consumption from purchases in the market or on meals eaten away from home but also food that was own produced or received as a gift. Third, non-purchased food items need to be valued in order to be included as part of consumption. The survey collects information on food purchases, thus it is possible to estimate a unit value for each food item by dividing the amount paid by the quantity purchased. Ideally food items will be disaggregated enough to be regarded as relatively homogeneous within each category, however these unit values will reflect also differences in the quality of the good. To take into account both this effect and spatial differences, median unit values are computed at several levels: cluster, district, urban and rural areas, and national. Hence if a household consumed a food item that was not purchased, the median unit value from its cluster would be used to value that consumption. If no other household consumed the same item in that cluster or if there are not enough observations to obtain a reliable unit value, the median unit value from the immediate upper level would be used to estimate the value of that consumption.

⁴ Appendix 1 displays all consumption components according to the Classification of Individual Consumption According to Purpose (COICOP).

A critical issue to deal with is the variety of measurement units in which households can report their food consumption. The questionnaires explicitly recognize 23 different quantity unit codes, ranging from standard units as kilograms and litres to non-standard units as heaps, pails, plates, cups and basins. The conversion of non-standard units into kilograms and litres is necessary because it simplifies considerably the estimation of unit values to impute a monetary value to the food consumption that was not purchased and was reported in non-standard units. The majority of conversion factors to transform non-standard units into kilograms come from a supplementary survey conducted in markets in all districts in the country at the time of the IHPS, while the remaining conversion factors come from a similar survey conducted at the time of the IHS3.

1.1.2 Non-food component

Data on an extensive range of non-food items are available: utilities such as kerosene and electricity; health; transport; communications; recreation; education; furnishings; personal care; etc. Surveys generally do not gather information on quantities consumed because most non-food items are too heterogeneous to try to calculate unit values. Each non-food component is associated with a particular reference period, which reflects the frequency of that purchase or consumption. For instance, expenses on public transport are collected for the last seven days, expenses on mobile phones and personal care are collected for the last month, expenses on clothing are collected for the last three months, and expenses on furnishings and small appliances are collected for the last twelve months. All expenditures are converted into annual figures.

Some non-food items are excluded from the consumption aggregate for different reasons. Payments of mortgages or debts are financial transactions and are not consumption. Losses to theft are neither expenditure nor consumption. Remittances to other households are expenditures but not consumption. Expenditures on marriages, dowries, births and funerals are consumption, but given their sporadic nature and the fact that the reported amounts are typically rather large, they are left out to avoid overestimating the true level of welfare of the household. Repairs to the dwelling and construction materials are excluded because the housing component of the consumption aggregate already takes into account any improvement to the dwelling.

1.1.3 Durable goods

Ownership of durable goods could be an important component of the welfare of the population. Since these goods last for many years, the expenditure on purchases is not the proper indicator to consider. The right measure to estimate, for consumption purposes, is the stream of services that households derive from all durable goods in their possession over the relevant reference period. This flow of utility is unobservable but it can be assumed to be proportional to the value of the good.

The estimation of this component of consumption relies on information on the number of durable goods owned, their age and their current value. First, purchases of these durable goods are 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. Second, the remaining lifetime is calculated as the current age minus the expected lifetime. If the current age of the durable good exceeded the expected lifetime,

the remaining lifetime would be replaced by two years. Last, the annual use value of each durable good is calculated as the current value divided by the remaining lifetime.

The survey collects information on household ownership of thirty-two durable goods. Twenty-two durable goods are included in the consumer durables component of the consumption aggregate (Table 1 shows their estimated average lifetime as well as the number of households that report owning them). The remaining ten durable goods are excluded mostly because they are production durables, that is, they are used for income-generating activities of the household.

Table 1: Estimated average lifetime of consumer durables

		2010		2013	
		Lifetime (years)	Households reporting	Lifetime (years)	Households reporting
1	Mortar/pestle (<i>mtondo</i>)	12.3	1497	14.8	1864
2	Bed	12.5	1441	14.1	1879
3	Table	12.4	1282	13.8	1429
4	Chair	10.2	1389	12.0	1670
5	Fan	6.6	173	8.3	262
6	Air conditioner	9.7	9	5.8	11
7	Radio ('wireless')	7.5	1589	8.1	1949
8	Tape or CD/DVD player	6.2	472	6.5	692
9	Television	7.3	424	8.7	697
10	VCR	8.5	46	9.6	67
11	Sewing machine	13.8	114	14.6	144
12	Kerosene/paraffin stove	10.0	34	11.5	16
13	Electric or gas stove	6.8	180	7.3	288
14	Refrigerator	9.6	193	10.2	332
15	Washing machine	6.0	8	9.6	11
16	Bicycle	11.4	1224	12.3	1628
17	Motorcycle/scooter	10.7	14	7.9	45
18	Car	7.7	79	8.2	114
19	Computer equipment	5.2	66	6.3	130
20	Satellite dish	6.2	136	7.5	266
21	Solar panel	4.4	43	4.6	139
22	Generator	4.6	36	8.0	54

1.1.4 Housing

Housing conditions are an essential part of people's living standards. As in the case of durable goods, the objective is to try measuring the flow of services received by the household from occupying its dwelling. When a household rents its dwelling, and provided rental markets function well, the value of housing would be the actual rent paid. If the household does not rent its dwelling, the survey asks how much the household could receive if it were to rent the dwelling out. Data on self-reported imputed rent can be used to estimate the value of housing, although they may not always be reliable. Alternatively, if enough people live in rented dwellings, that information could be used to impute rents for those that live in their own dwellings.

A hedonic rental regression is estimated with the rent (actual or self-reported) as the dependent variable and a set of independent variables that includes the main material of the walls, the main material of the roof, the main material of the floor, the number of rooms, the main source of drinking water, the type of toilet facility, 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 this regression is used to impute the value of housing for those households that reported an unreasonable rent or that did not report any rent at all.

1.2 Adjustment for cost of living differences

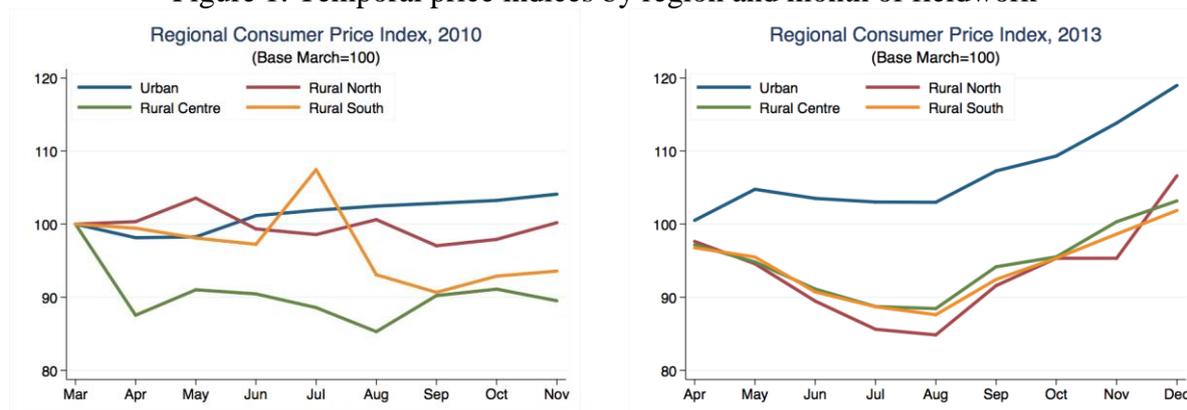
1.2.1 Within each round

The nominal consumption of the household must be adjusted for temporal and spatial cost-of-living differences. Temporal differences are associated with the duration of the fieldwork (MK1000 in April may not have the same value as in October), whereas spatial differences are associated with the location of the household interviewed in the survey (MK1000 in Lilongwe may not have the same value as in Machinga).

Price indices are constructed at the regional level using data from the consumer price index (CPI) rather than from the survey. Both the CPI and the household survey cover urban and rural areas and can provide information on prices of food items, but the main advantage of the CPI over the survey is the availability of prices of non-food items. The regions considered are urban areas, rural north, rural centre and rural south.

The first step of the adjustment refers to the temporal cost-of-living differences. The regional monthly CPI is used to adjust nominal consumption to prices of March of each region. The use of the official regional inflation guarantees that the adjustment relies on baskets that consist of food and non-food items. Hence, consumption in the first round is temporally adjusted to regional prices of March 2010 and in the second round to regional prices of March 2013. Figure 1 shows these price indices.

Figure 1: Temporal price indices by region and month of fieldwork



The second step of the adjustment deals with the spatial cost-of-living differences. A Laspeyres price index by region is estimated based on a selection of food and non-food items present in all 15 CPI domains: 38 in 2010 and 47 in 2013. The difference in the number of common items stems from a CPI rebase implemented by the NSO in 2012, which means that the 2010 CPI bundles are different from those in 2013. The common bundle across CPI domains accounts for 51% of the full CPI bundle in 2010 and for 46% in 2013. The weights of the items in the price index correspond to the shares of these items at the national level.

The base for the spatial price index is All-Malawi during the entire period of the fieldwork: March to November 2010 for the first round of the panel and April to December 2013 for the second round of the panel. These median national prices are compared with median regional prices covering the same periods. Using the full fieldwork period for both the base and the comparison periods is likely to provide a more robust regional ranking of spatial cost-of-living differences than when using a particular month or quarter. Table 2 shows the spatial price indices in both rounds of the panel survey. Urban areas are the most expensive in the country in both years, although in 2010 the rural north is similarly expensive. The cheapest region in the first round is the rural centre and in the second round is the rural south.

Table 2: Laspeyres spatial price indices by region

	2010	2013
Malawi	1.000	1.000
Urban	1.046	1.116
Rural North	1.043	1.060
Rural Centre	0.948	0.914
Rural South	0.978	0.861

1.2.1 Across rounds

Price indices are required also to update monetary figures across both rounds of the panel survey. The previously discussed price indices adjust nominal consumption for cost of living differences within each round. A second price adjustment is necessary however to have both rounds at the same constant real prices because it would be incorrect to compare IHS3 real consumption at 2010 prices with IHPS real consumption at 2013 prices.

The first option to carry out this adjustment would have been to estimate the average increase in the cost of living between both rounds using the CPI. The 2012 rebase of the CPI however did not implement any procedure to link the previous CPI series with the new CPI series, hence it is not possible to estimate the inflation between both rounds with a single CPI series. An alternative method is to combine the previous CPI series (which goes up to December 2012) with the new CPI series (which takes 2012 as the base year and then starts in January 2013). The resulting overall inflation between March 2010 and March 2013 is 54%, the food inflation is 40% and the nonfood inflation is 71%. These figures though do not reflect the true increase in the cost of living because the NSO did not update the old CPI series after a review done to the CPI in 2012 (the review that prompted the rebase of the CPI). Although the 2012 review had focused only on food inflation, it found that the inflation between 2005 and 2011 was severely underestimated. Given that the recommendations of the review in terms of better data collection, handling of missing values and estimation of the inflation are reflected in practice since January 2013, the official inflation for the period 2010-2012 cannot be trusted to adjust for cost of living differences across rounds.

A final approach to rely on CPI data is to use the raw price data to construct a price index in a similar manner to that used for the price adjustment within each round. A total of 24 items are present in all 15 CPI domains in both old and new bundles: 20 food items and 4 nonfood

items. This procedure overcomes most of the limitations of the official inflation because the 2012 revision updated the entire raw food price data from 2005 to 2011, which means that almost all the items included in the selected bundle do have reliable price information. The fieldwork period of the IHS3 is considered the base period (March to November 2010) and the fieldwork period of the IHPS is considered the comparison period (April to December 2013). The results show that the inflation according to the Laspeyres index is 125%, according to the Paasche index is 133% and according to the Fisher index is 129%. Even though it is evident the disparity in the estimated figures when compared to the official inflation, the representativeness of the chosen bundle may raise some objections because its share drops significantly from 44% of the old CPI bundle to 27% of the new CPI bundle.

The household survey provides another alternative to address the adjustment for cost of living differences across rounds. A food price index can be estimated based on the food module of the household survey and a nonfood price index can be estimated based on the price data collected in the community questionnaire. Median food unit values and median nonfood prices are used rather than mean values. In the case of food, only items purchased by at least 50 households in the country (an arbitrary threshold to exclude items purchased by barely a few households) are included in the construction of the price indices. The base period is the IHS3 fieldwork period and the comparison period is the IHPS fieldwork period. The food and the nonfood price indices are combined using the food and the nonfood consumption shares of the full IHS3 survey: 58.7% and 41.3% respectively. Table 3 summarises the calculations that produce an inflation rate across rounds of 132% according to the Laspeyres index. While these figures are relatively similar to those obtained with the CPI-based price indices, *the survey-based price indices are preferred because the consumption share covered by their bundle is considerably higher (it stays constant over time at 58%) and because there are no concerns about the reliability of nonfood prices. Hence an inflation of 132% is used to adjust the consumption aggregate between the IHS3 and the IHPS.*

Table 3: Survey-based price index to adjust consumption across rounds

	Food	Nonfood	Total
Laspeyres price index	2.30	2.35	2.32
Source	Household	Community	
Items included	55	10	65
IHS3 consumption share	93	13	58
IHPS consumption share	90	12	58

1.3 Adjustment for household composition

The final step in constructing the welfare indicator involves going from a measure of standard of living defined at the household level to another at the individual level because the ultimate objective is to make comparisons across individuals and not across households. Equivalence scales are the factors that convert real household consumption into real individual consumption by correcting for differences in the demographic composition and size of households.

The first adjustment relates to the demographic composition of households. Household members might have different needs based on their age and gender. For instance, children are thought to need a fraction of what adults require, hence if a comparison is made between two

households with the same total consumption and equal number of members, but one of them has children while the other comprises only adults, it could be expected that the former will have a higher individual welfare than the latter. Unfortunately there is no agreement on a consistent methodology to calculate these scales. Some are based on nutritional grounds, a child may need only 50% of the food requirements of an adult, but it is not clear why the same scale should be carried over non-food items. It may very well be the case that the same child requires more in education expenses or clothing.

The second adjustment focuses in the economies of scale in consumption within the household. The motivation for this is the fact that some of the goods and services consumed by the household have characteristics of “public goods”. A good is said to be public when its consumption by a member of the household does not necessarily prevent another member to consume it too. Examples of these goods could be housing and durable goods, that is, goods that can be shared among household members. Larger households may spend less to be as well-off as smaller ones. Hence, the bigger the share of public goods in total consumption is, the larger the scope for economies of scale is. On the other hand, private goods cannot be shared among members, once one member has consumed them, no other member can. Food is the classic example of a private good, for instance, in economies where food represents a sizeable share of the household budget, little room exists for economies of scale.

Both adjustments can be implemented using the following approach:

$$AE = (A + \alpha K)^\theta$$

where AE is the number of adult equivalents of the household, A is the number of adults, K the number of children, α is the parameter that measures the relative cost of a child compared to an adult and θ represents the extent of the economies of scale. Both parameters can take values between 0 and 1. The present analysis uses a per capita adjustment, which is a special case of the above formulation and happens when both α and θ are set equal to 1. This means that children consume as much as adults and there is no room for economies of scale. In other words, it is assumed that all members within the household consume equal shares of the total consumption and costs increase in proportion to the number of people in the household. In general, per capita measures will underestimate the welfare of households with children as well as larger households with respect to families with no kids or with a small number of members respectively. Thus it is important to conduct sensitivity analysis to see how robust the poverty measures and poverty rankings are to different assumptions regarding child costs and economies of scale. Appendix 2 will show these results.

2 Poverty lines

The poverty line can be defined as the monetary cost to a given person, at a given place and time, of a reference level of welfare⁵. If a person does not attain that minimum level of standard of living, she will be considered poor. The poverty line will be absolute because it fixes this standard of living in the country, hence guaranteeing that comparisons across individuals will be consistent, that is, two persons with the same welfare level will be treated the same way regardless of the location where they live. The reference standard of living is

⁵ Ravallion (1998) and Ravallion (1996).

anchored to nutritional attainments, in this particular case that the person obtains the necessary energy requirements to have a healthy and active life.

The poverty line used in this analysis of the first two rounds of the panel survey is the same constant real poverty line used in the analysis of the 2004/05 IHS2 and the full 2010/11 IHS3. A brief explanation of how the initial 2004/05 IHS2 poverty lines were estimated follows.⁶ The total poverty line comprises two principal components: food and non-food. The food poverty line represents the cost of a food bundle that provides the necessary energy requirements per person per day. First, the daily calorie requirement was set at 2,400 kilocalories per person. Second, the price per calorie was estimated from the population in the fifth and sixth deciles of the per capita consumption distribution. Last, the food poverty line was calculated as the daily calorie requirement per person multiplied by the price per calorie. The non-food poverty line represents an allowance for basic non-food needs. It was estimated as the average non-food consumption of the population whose food consumption is close to the food poverty line. The total poverty line is the sum of the food and non-food poverty lines. The 2010/11 IHS3 poverty lines are updated to 2013 prices using the same price index to adjust for cost-of-living differences across rounds. Table 4 shows the poverty lines used in this analysis.

Table 4: Poverty lines per person per year
2013 prices

Food	53,262
Non-food	32,589
Total	85,852

3 Poverty measures

The literature on poverty measurement is extensive, but the focus will be on the class of poverty measures proposed by Foster, Greer and Thorbecke. This family of measures can be summarized by the following equation:

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^{\alpha}$$

where α is some non-negative parameter, z is the poverty line, y denotes consumption, i represents individuals, n is the total number of individuals in the population, and q is the number of individuals with consumption below the poverty line.

The headcount index ($\alpha=0$) gives the share of the poor in the total population, i.e., it measures the percentage of population whose consumption is below the poverty line. This is the most widely used poverty measure mainly because it is very simple to understand and easy to interpret. However, it has some limitations. It takes into account neither how close or far the consumption levels of the poor are with respect to the poverty line nor the distribution

⁶ See NSO (2005) for a detailed explanation about the estimation of the poverty lines.

among the poor. The poverty gap ($\alpha=1$) is the average consumption shortfall of the population relative to the poverty line. Since the greater the shortfall, the higher the gap, this measure overcomes the first limitation of the headcount. Finally, the severity of poverty ($\alpha=2$) is sensitive to the distribution of consumption among the poor, a transfer from a poor person to somebody less poor may leave unaffected the headcount or the poverty gap but will increase this measure. The larger the poverty gap is, the higher the weight it carries.

These measures satisfy some convenient properties. First, they are able to combine individual indicators of welfare into aggregate measures of poverty. Second, they are additive in the sense that the aggregate poverty level is equal to the population-weighted sum of the poverty levels of all subgroups of the population. Third, the poverty gap and the severity of poverty satisfy the monotonicity axiom, which states that even if the number of the poor is the same, but there is a welfare reduction in a poor household, the measure of poverty should increase. And fourth, the severity of poverty will also comply with the transfer axiom: it is not only the average welfare of the poor that influences the level of poverty, but also its distribution. In particular, if there is a transfer from one poor household to a richer household, the degree of poverty should increase.

4 Poverty results

Before commenting on the poverty findings, a clarification with respect to the sample used for these estimations is necessary. The IHPS is a panel survey that follows over time the people living in the households that were interviewed during the IHS3. Even though the attrition is limited to 3.78 percent at the household level and 7.42 percent at the individual level, there were still individual tracking targets that the IHPS could not interview. Nevertheless, the sample grew from 3,246 households in 2010 to 4,000 households in 2013 by way of tracking split-off individuals and bringing into the sample new households formed by them. For the purposes of poverty and inequality comparisons over time, we focus on the sample of **individuals** that had been interviewed during the IHS3 and that were also tracked and re-interviewed during the IHPS (i.e. we are not working with a panel of households, rather with a panel of individuals). The purpose of this decision is to have a stricter comparison of the dynamics of the living standards of the population.

Finally, at its inception, the IHPS had been designed to be *complementary* to the official poverty analyses based on the IHS that is typically conducted every 5 years (rather than serving as a substitute in the interim years of an IHS). Unlike the cross-sectional IHS, the IHPS allows for understanding movements in and out of poverty for the same group of individuals. Moreover, the IHPS does measure consumption directly, but only during approximately half of the calendar period that is covered by a standard IHS. The non-lean season months of consumption data collection during the IHPS enables the survey to be in-sync with the agricultural season and to reduce recall associated with agricultural reporting. However, it does come at the cost of not collecting data during a 12-month period. For this reason, the 2013 poverty statistics based on the IHPS should be understood as the lower-bound for the actual poverty in Malawi.

The incidence of poverty falls from 40 percent of the population in 2010 to 39 percent in 2013 (see Table 5). Urban areas display an increase in poverty, while rural areas experience a decline in the share of those who are poor. The proportion of the population considered poor drops in the north and the south regions but rises in the centre. Despite that some of these

changes in the incidence of poverty across rounds appear to be fairly large, none of them is statistically significant.

A couple of patterns hold in the first two rounds of the panel survey. Rural areas have a significant higher poverty incidence than urban areas, but the difference becomes smaller over time because rural areas improved and urban areas worsened. Across regions, the highest percentage of poor is observed in the north in both rounds. The comparison between the centre and the south shows that in 2010 the former is considerably less poor than the later, although by 2013 both have similar poverty rates. Statistically significant differences in poverty rates across regions occur only in the first round: the north is as poor as the south, and both of these regions are poorer than the centre.

The poverty gap, which is the average consumption shortfall of the population relative to the poverty line, and the poverty squared gap, which in addition takes into account the distribution of consumption among the poor, present most of the patterns observed with the poverty incidence. No significant temporal changes happen with the exception of the poverty gap squared in the south being lower in 2013 than in 2010. Poverty in the countryside is higher than in cities, although less so in the second round. The ranking across regions shows the north being the poorest region, while the region where poverty is the lowest is the centre in the first round and in the south in the second round.

Table 5: Poverty indices

	2010				2013			
	Estimate	St. err.	[95% conf. int.]		Estimate	St. err.	[95% conf. int.]	
Incidence								
Malawi	40.2	1.8	36.7	43.7	38.7	1.8	35.2	42.3
Urban	17.9	4.9	8.2	27.6	26.2	5.3	15.7	36.7
Rural	44.0	2.0	40.1	47.8	40.9	1.9	37.1	44.7
North	50.2	3.8	42.7	57.7	43.3	3.9	35.7	51.0
Centre	33.5	2.8	27.9	39.0	39.0	2.7	33.7	44.3
South	45.0	2.8	39.6	50.5	37.3	2.7	32.0	42.7
Gap								
Malawi	12.9	0.9	11.3	14.6	11.1	0.7	9.8	12.4
Urban	4.4	1.2	2.0	6.7	7.3	2.0	3.3	11.4
Rural	14.4	1.0	12.5	16.3	11.7	0.7	10.3	13.1
North	16.9	1.5	13.9	19.8	12.9	1.4	10.0	15.7
Centre	9.7	1.2	7.3	12.1	11.1	1.0	9.2	13.0
South	15.5	1.5	12.5	18.4	10.6	1.1	8.5	12.7
Gap squared								
Malawi	5.8	0.5	4.8	6.8	4.5	0.3	3.8	5.2
Urban	1.5	0.4	0.6	2.3	2.9	0.9	1.1	4.7
Rural	6.5	0.6	5.4	7.7	4.8	0.4	4.0	5.6
North	7.5	0.8	5.9	9.1	5.5	0.7	4.1	6.9
Centre	4.0	0.7	2.7	5.3	4.5	0.5	3.5	5.5
South	7.3	0.9	5.5	9.1	4.3	0.6	3.2	5.4

One of the key features of a panel survey is the possibility of analysing the poverty transitions experienced by the population across time (see Table 6). Two out of three people remain in their respective poverty status: 44% stay out of poverty and 23% stay poor. The remaining third of the population is almost evenly split between the 17% that escape poverty and the 15% that become poor. Urban areas experience less mobility across poverty states than rural areas, a finding that is consistent with their lower poverty incidence. Across regions, the population that changes its poverty status is fairly similar in all regions. Upward mobility is considerably larger than downward mobility in both the north and the south, while the opposite happens in the centre.

Table 6: Poverty transitions between 2010 and 2013

2010 location	Stay nonpoor	Become nonpoor	Become poor	Stay poor	Total
Malawi	44	17	15	23	100
Urban	67	6	15	12	100
Rural	41	19	15	25	100
North	36	21	14	29	100
Centre	48	13	19	20	100
South	43	20	12	25	100

4.1 Robustness of the poverty results

4.1.1 To the level of the poverty line

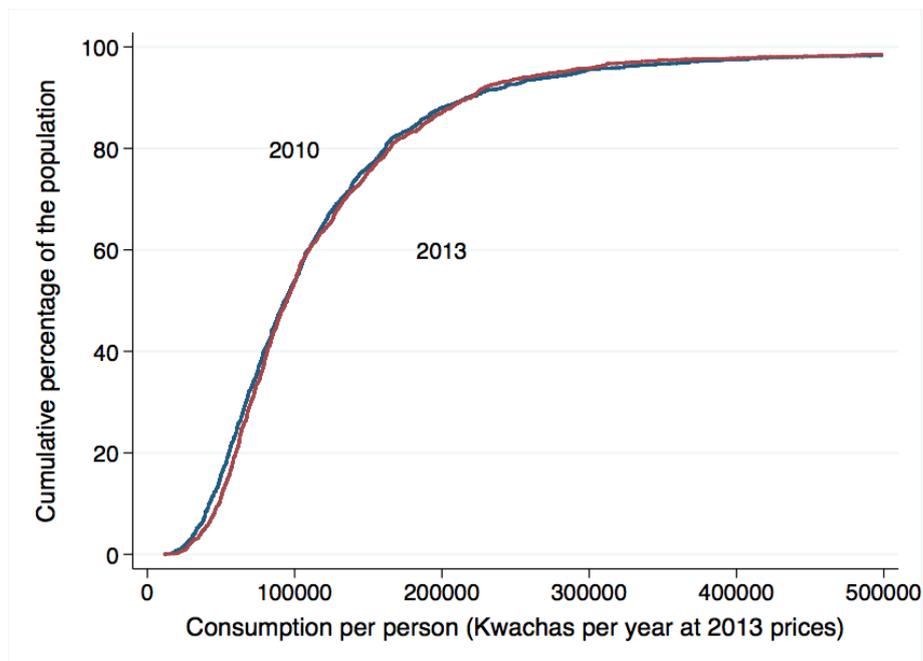
A natural concern that arises is to evaluate the sensitivity of the poverty incidence with respect to the level of the poverty line because an unavoidable degree of arbitrariness is involved in the process of deriving the poverty line. Many explicit and implicit assumptions have been made along the way and not everybody may agree with them. Other poverty lines might be equally appealing and justified. Assessing the degree to which the incidence of poverty will change when the poverty line varies and how robust the poverty comparison is between 2010 and 2013 can be observed in Table 7. The differences over time in poverty incidence remain fairly stable at the national level, in urban areas and in rural areas when the poverty line is scaled upward or downward. These findings suggest that the modest fall in poverty in the country, the increase in urban areas and the decline in rural areas are robust results when the poverty line is scaled within a reasonable range.

Table 7: Sensitivity of the poverty incidence to changes in the poverty line

	National		Urban		Rural	
	2010	2013	2010	2013	2010	2013
Poverty line - 20 percent	27.4	24.5	10.8	16.6	30.2	25.9
Poverty line - 15 percent	30.4	28.0	13.5	19.1	33.2	29.5
Poverty line - 10 percent	33.5	31.2	15.0	21.1	36.7	33.0
Poverty line - 5 percent	36.9	35.5	16.0	24.1	40.4	37.4
Poverty line	40.2	38.7	17.9	26.2	44.0	40.9
Poverty line + 5 percent	43.2	41.8	20.0	28.3	47.2	44.2
Poverty line + 10 percent	45.8	44.4	21.3	30.4	49.9	46.9
Poverty line + 15 percent	48.4	47.5	23.6	32.9	52.6	50.1
Poverty line + 20 percent	51.2	50.7	25.7	36.6	55.5	53.1

A more general extension to the previous robustness check is to plot the cumulative distribution functions of consumption (Figure 2). For a given consumption level on the horizontal axis, the curves indicate on the vertical axis the percentage of the population with a lesser or equal level of consumption in each round of the IHPS. If one thinks of the chosen consumption level as the poverty line, the curves will show the associated poverty incidence and thus they can be seen as poverty incidence curves. Given that the curves overlap each other for most part of the distribution, the conclusion is that the poverty incidence remains unchanged between 2010 and 2013 regardless of the level of the poverty line.

Figure 2: Poverty incidence curves



4.1.2 To the inflation across rounds

A second set of robustness checks addresses the choice of the inflation to adjust consumption across rounds. Table 8 shows the poverty indices when the adjustment is done with the CPI-based price index, that is, assuming an inflation of 129% rather than the 132% based on the household and community surveys. Given how close both estimates of inflation are, it is not unexpected that almost all trends over time remain the same. A couple of statistically significant changes occur however: the falls in the poverty gap in the south and in the poverty squared gap in rural areas become statistically significant.

Table 8: Sensitivity of the poverty indices to the inflation to adjust across rounds

	2010				2013			
	Estimate	St. err.	[95% conf. int.]		Estimate	St. err.	[95% conf. int.]	
Incidence								
Malawi	40.2	1.8	36.7	43.7	37.6	1.8	34.1	41.1
Urban	17.9	4.9	8.2	27.6	25.2	5.3	14.6	35.7
Rural	44.0	2.0	40.1	47.8	39.8	1.9	36.0	43.5
North	50.2	3.8	42.7	57.7	41.4	3.9	33.7	49.2
Centre	33.5	2.8	27.9	39.0	37.9	2.7	32.6	43.1
South	45.0	2.8	39.6	50.5	36.4	2.7	31.1	41.7
Gap								
Malawi	12.9	0.9	11.3	14.6	10.7	0.7	9.4	12.0
Urban	4.4	1.2	2.0	6.7	7.1	2.0	3.1	11.0
Rural	14.4	1.0	12.5	16.3	11.4	0.7	10.0	12.7
North	16.9	1.5	13.9	19.8	12.5	1.4	9.7	15.3
Centre	9.7	1.2	7.3	12.1	10.8	0.9	8.9	12.6
South	15.5	1.5	12.5	18.4	10.3	1.1	8.2	12.3
Gap squared								
Malawi	5.8	0.5	4.8	6.8	4.4	0.3	3.7	5.0
Urban	1.5	0.4	0.6	2.3	2.8	0.9	1.0	4.5
Rural	6.5	0.6	5.4	7.7	4.6	0.4	3.9	5.4
North	7.5	0.8	5.9	9.1	5.3	0.7	4.0	6.6
Centre	4.0	0.7	2.7	5.3	4.4	0.5	3.4	5.3
South	7.3	0.9	5.5	9.1	4.1	0.5	3.0	5.2

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Appendix 1

Table A1.1: IHS3 and IHPS consumption according to the COICOP

COICOP code	Description	Module and question
01	Food and non-alcoholic beverages	
01.1	Food	
	Cereals, tubers, nuts, vegetables, fruits, oil, sugar, etc.	G101-G818
01.2	Non-alcoholic beverages	
	Tea; coffee; cocoa, Milo; squash; fruit juice; freezes; soft drinks; bottled water; <i>maheu</i> ; and other	G901-G907, G909, G910, G916
02	Alcoholic beverages and tobacco	
02.1	Alcoholic beverages	
	Bottled or canned beer, <i>thobwa</i> , traditional beer (<i>masese</i>), wine or commercial liquor, locally brewed liquor (<i>kachasu</i>), and chibuku (commercial traditional-style beer)	G908, G911-G915
02.2	Tobacco	
	Cigarettes or other tobacco	I103
03	Clothing and footwear	
03.1	Clothing	
	Infant clothing	J301
	Baby nappies/diapers	J302
	Boy's trousers	J303
	Boy's shirts	J304
	Boy's jackets	J305
	Boy's undergarments	J306
	Boy's other clothing	J307
	Men's trousers	J308
	Men's shirts	J309
	Men's jackets	J310
	Men's undergarments	J311
	Men's other clothing	J312
	Girl's blouse/shirt	J313
	Girl's dress/skirt	J314
	Girl's undergarments	J315
	Girl's other clothing	J316
	Lady's blouse/shirt	J317
	<i>Chitenje</i> cloth	J318
	Lady's dress/skirt	J319

COICOP code	Description	Module and question
	Lady's undergarments	J320
	Lady's other clothing	J321
	Cloth, thread, other sewing material	J326
	Laundry, dry cleaning, tailoring fees	J327
03.2	Footwear	
	Boy's shoes	J322
	Men's shoes	J323
	Girl's shoes	J324
	Lady's shoes	J325
04	Housing, water, electricity, gas and other fuels	
04.1	Actual rents for housing	
	Actual rent payment	F04
04.2	Imputed rents for housing	
	Estimated the rent for non-renters	F03
04.4	Water supply	
	Water for cooking, bathing, etc.	F37
04.5	Electricity, gas and other fuels	
	Value of the firewood used in the past week	F18
	Electricity	F25
	Charcoal	I101
	Paraffin or kerosene	I102
	Candles	I104
	Matches	I105
	Light bulbs	I209
	Solar panel	L531
	Generator	L532
05	Furnishings, household equipment and routine home maintenance	
05.1	Furniture, furnishings, carpets and other floor coverings	
	House decorations	J338
	Carpet, rugs, drapes, curtains	K401
	Mat - sleeping or for drying maize flour	K403
	Mosquito net	K404
	Mattress	K405
	Bed	L502
	Table	L503
	Chair	L504
05.2	Household textiles	

COICOP code	Description	Module and question
	Linen - towels, sheets, blankets	K402
05.3	Household appliances	
	Repairs to household and personal items (radios, watches, etc.)	I218
	Fan	L505
	Air conditioner	L506
	Sewing machine	L511
	Kerosene/paraffin stove	L512
	Electric or gas stove; hot plate	L513
	Refrigerator	L514
	Washing machine	L515
05.4	Glassware, tableware and household utensils	
	Bowls, glassware, plates, silverware, etc.	J328
	Cooking utensils (pots, stirring spoons, whisks, etc.)	J329
05.5	Tools and equipment for home	
	Batteries	I220
	Recharging batteries of cell phones	I221
	Torch / flashlight	J331
	Paraffin lamp (hurricane or pressure)	J333
	Mortar/pestle (<i>mtondo</i>)	L501
05.6	Goods and services for routine home maintenance	
	Milling fees, grain	I201
	Wages paid to servants	I215
	Cleaning utensils (brooms, brushes, etc.)	J330
06	Health	
06.1	Medical products, appliances and equipment	
	Expenditure for non-prescription medicines (Panadol, Fansidar, cough syrup, etc.)	D12
06.2	Out-patient services	
	Expenditures for illnesses and injuries (medicine, tests, consultation, & in-patient fees)	D10
	Expenditure not related to an illness (preventative health care, pre-natal visits, check-ups)	D11
	Stay(s) at the traditional healer or faith healer	D19
	Stay(s) at the traditional healer or faith healer, transport costs	D20
	Stay(s) at the traditional healer or faith healer, food costs	D21
06.3	Hospital services	
	Hospitalization(s) or overnight stay(s) in a medical facility	D14
	Hospitalization(s) or overnight stay(s) in a medical facility, transport costs	D15

COICOP code	Description	Module and question
	Hospitalization(s) or overnight stay(s) in a medical facility, food costs	D16
07	Transport	
07.1	Purchase of vehicles	
	Bicycle	L516
	Motorcycle/scooter	L517
	Car	L518
07.2	Operation of vehicles	
	Petrol or diesel	I212
	Motor vehicle service, repair, or parts	I213
	Bicycle service, repair, or parts	I214
07.3	Transport services	
	Public transport – Bicycle, taxi	I107
	Public transport – Bus, minibus	I108
	Public transport – Other	I109
08	Communication	
08.1	Postal services	
	Postage stamps or other postal fees	I210
08.3	Telephone and fax services	
	Cell phone	F35
09	Recreation and culture	
09.1	Audio-visual, photographic and information processing equipment	
	Music or video cassette or CD	J336
	Film, film processing, camera	K407
	Radio (wireless)	L507
	Tape or CD player; HiFi	L508
	Television	L509
	VCR	L510
	Computer equipment & accessories	L529
	Satellite dish	L530
09.2	Durables for recreation and culture, including repairs	
	Sports and hobby equipment, musical instruments, toys	K406
09.3	Other recreational items and equipment, gardens and pets	
	Expenditures on pets	I219
09.4	Recreational and cultural services	
	Tickets for sports / entertainment events	J337

COICOP code	Description	Module and question
09.5	Newspapers, books, stationery	
	Newspapers or magazines	I106
	Stationery items (not for school)	J334
	Books (not for school)	J335
10	Education	
10.1	Education, all levels	
	Tuition, including any extra tuition fees	C22A
	After school programs and tutoring	C22B
	School books and stationery	C22C
	School uniform and clothing	C22D
	Boarding school fees	C22E
	Contributions for school building or maintenance	C22F
	Transport	C22G
	Parent association and other school related fees	C22H
	Other school expenses	C22I
11	Restaurants and hotels	
11.1	Vendors, cafes, restaurants	
	Vendor consumption: maize (boiled or roasted), chips, cassava, eggs, chicken, meat, fish, <i>mandazi</i> , samosa, meals eaten at restaurants, other	G820-G830
11.2	Accommodation services	
	Night's lodging in rest house or hotel	J339
12	Miscellaneous goods and services	
12.1	Personal care	
	Bar soap (body soap or clothes soap)	I202
	Clothes soap (powder)	I203
	Toothpaste, toothbrush	I204
	Toilet paper	I205
	Glycerine, Vaseline, skin creams	I206
	Other personal products (shampoo, razor blades, cosmetics, hair products, etc.)	I207
12.3	Personal effects	
	Umbrella	J332

Appendix 2: Evaluating alternative equivalence scales

The adjustment for household composition of the consumption aggregate has been done by dividing the household consumption aggregate by the number of household members, thus obtaining the per capita consumption aggregate as the measure of individual welfare. The adjustment intends to correct for differences in needs among household members because of their gender and sex and to correct for economies of scale in consumption within the household.

The per capita adjustment assumes that all household members consume an equal share of total consumption and that there are no economies of scale within the household. However other equivalence scales can be used to make this adjustment. A child might indeed consume on average less than an adult. A two-person household does not imply double expenditures on housing, utilities or other non-food items for which expenditure can be shared (these are public goods whose cost does not vary by the number of people using these goods).

It is important then to test the robustness of the poverty analysis to the assumptions made. Adjusting for household size and composition can be done in numerous ways and there is not one widely accepted scale. An alternative equivalence scale based exclusively on the age of the person is shown in Table A2.1. The adjustment for economies of scale relies on the share of public goods in the overall consumption. According to the IHS3, the share of housing, utilities and furnishings is around 20% and it might increase slightly more if one includes some other goods and services that could be considered to be public goods. It was decided that a correction for economies of scale was not necessary because while this share is not negligible, it is unlikely to have a significant impact on the poverty indices and the poverty profile.

Table A2.1: Adult Equivalent Scales

Age (years)	Adult equivalent
<1	0.33
1-2	0.47
2-3	0.55
3-5	0.63
5-7	0.73
7-10	0.79
10-12	0.84
12-14	0.91
14-16	0.97
16-18	1.00
18+	1.00

An initial step in the robustness exercise would be to determine how close per capita consumption and per adult equivalent consumption move together. The correlation between these two measures is 0.99 in both rounds of the panel survey, which indicates that they move closely together. Concerns about these measures misclassifying people differently are lessened when a comparison is made between the 50% of the population ranked in terms of per capita consumption and the 50% of the population ranked in terms of per adult equivalent consumption (see Table A2.2). The percentage of the population classified in the same poverty status under both consumption aggregates stands at 96% in both 2010 and 2013. This

finding suggests that the two consumption aggregates identify almost the same population once a fixed poverty incidence is chosen.

Table A2.2 Classifying the poor using alternative consumption aggregates

	Per adult equivalent consumption		
	Non poor	Poor	Total
IHS3 per capita consumption			
Non poor	48	2	50
Poor	2	48	50
Total	50	50	100
IHPS per capita consumption			
Non poor	48	2	50
Poor	2	48	50
Total	50	50	100

It is also important to ascertain that the general poverty profile is robust to choice of the equivalence scale. In order to examine the robustness of the per capita consumption, the poverty rate is fixed at 50% of the population and then the corresponding poverty profiles under the both consumption aggregates are compared. The focus will be on two dimensions: the poverty rate across different groups of the population and the share of the poor across groups. Different groups of the population are considered based on the gender of the household head, the number of children in the household, the dependency ratio of the household, whether the household comprises only elder members, and the location of the household. Tables A2.3 shows that the poverty profile (in terms of poverty rates and shares of the poor) is remarkably stable between the two sets of equivalence scales. That is, the profile of the bottom 50% of the population in terms of consumption is similar regardless of the use of per capita scales or per adult equivalent scales.

Table A2.3
Poverty profile using alternative consumption aggregates, 2010
(Fixed national poverty incidence of 50%)

	Poverty incidence (%)		Poor shares (%)		Population shares (%)
	Per capita	Per adult equivalent	Per capita	Per adult equivalent	
Malawi	50	50	100	100	100
Non-elderly households	50	51	100	100	99
Elderly households	21	26	0	0	1
Male-headed households	48	49	76	77	80
Female-headed households	58	58	24	23	20
Low dependency ratio	34	39	20	22	29
High dependency ratio	56	55	80	78	71
Low number of children	35	38	30	32	43
High number of children	61	60	70	68	57
Households with no children	17	26	3	4	8
Households with one child	31	32	8	8	13
Households with two children	44	45	19	20	22
Households with three and more children	61	60	70	68	57
Urban	26	25	8	8	15
Rural North	62	62	14	14	11
Rural Centre	45	46	32	33	36
Rural South	61	61	46	46	38

Note: A household is considered an elderly household if all of its members are 60 years and above, otherwise the household is considered non-elderly.

A high dependency ratio household is a household with a dependency ratio greater than the national average.

The dependency ratio is the ratio between children (less than 15 years) and elders (60 years and above) with respect to total household size.

A household is classified as having a high number of children if the number of children in the household is greater than the national average.

Table A2.4
Poverty profile using alternative consumption aggregates, 2013
(Fixed national poverty incidence of 50%)

	Poverty incidence (%)		Poor shares (%)		Population shares (%)
	Per capita	Per adult equivalent	Per capita	Per adult equivalent	
Malawi	50	50	100	100	100
Non-elderly households	50	51	100	100	99
Elderly households	8	14	0	0	1
Male-headed households	49	50	78	78	79
Female-headed households	52	53	22	22	21
Low dependency ratio	36	40	23	26	32
High dependency ratio	57	55	77	74	68
Low number of children	32	35	27	30	43
High number of children	63	62	73	70	57
Households with no children	19	26	3	4	7
Households with one child	28	31	8	9	15
Households with two children	39	40	17	17	21
Households with three and more children	63	62	73	70	57
Urban	35	36	11	11	16
Rural North	59	60	10	10	8
Rural Centre	52	53	40	40	38
Rural South	52	52	40	39	38

Note: A household is considered an elderly household if all of its members are 60 years and above, otherwise the household is considered non-elderly.

A high dependency ratio household is a household with a dependency ratio greater than the national average.

The dependency ratio is the ratio between children (less than 15 years) and elders (60 years and above) with respect to total household size.

A household is classified as having a high number of children if the number of children in the household is greater than the national average.