ESTIMATING WEALTH EFFECTS WITHOUT EXPENDITURE DATA: EVIDENCE FROM RURAL ETHIOPIA

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Abstract

In economic studies, household economic status is usually proxied by measures of consumption or income. In recent years, several studies have advanced an asset-based index as an alternative measure of wealth status. In most studies, the asset-based wealth index is constructed with a standard list of assets comprising household ownership of consumer durables, the characteristics of the household's dwelling and sometimes household landownership.

Although a standard list may be useful when comparing households across countries or urban and rural residents in one country, the assets included may not always be relevant for studies focussing on rural areas or a particular rural area only. This paper addresses the question what assets should be included in the wealth index to the best reflect long-term economic status in rural Ethiopia. We use data from the Ethiopian Rural Household Survey (ERHS) collected in 1994 and 1995 to construct several asset-based wealth indices. We find not all standard assets are relevant locally and signs and heights of factor loadings differ substantially between localities, supporting the case of specified (local) asset listings. The specified asset index performs best compared to other asset indices when considering the distribution of food security across wealth quintiles and is at least as good a predictor of food security as per capita consumption measure for the same households.

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1 Introduction[2]

In the past decade, several studies have advanced an asset-based index as an alternative measure of economic status. The indices used in these studies are based on a defined set of household assets including housing characteristics and durables. This measure of economic status is much easier to construct and far less demanding in terms of data collection compared to the conventional consumption or income based proxies used to compare outcomes across different economic groups. Asset-based wealth indices have, for example, been used to estimate the effect of wealth on educational attainment (Filmer and Pritchett, 1999) and nutrition status or to assess changes in poverty over time (Sahn and Stifel, 2000).

Although some studies have discussed the validity of an asset-based proxy for economic status versus an income or consumption based proxy (Sahn and Stifel, 2003, Filmer and Pritchett, 2001, and Lindelow, 2002) little attention has been given to the type of assets to be included in the index.[3] The wealth indices used in the literature so far are based on a more or less standard list of items including assets relating to housing conditions and ownership of consumption durables, sometimes extended to include productive capital (such as land) or human capital (level of education of the household head). The choice of assets is hardly ever discussed. The most commonly used assets for the index include durables such as television, fridge, car and access to electricity. Such assets may be relevant to construct a measure of economic status to make comparisons across countries or households at a national level, comprising both urban and rural households; they seem to be less relevant for a study conducted in poor rural communities. Even less so in more disaggregated studies, e.g. focussing on one village in specific, where ownership of particular assets, such as toilet facilities, may not vary within a village.

This leads to an important question that is central to this paper: What assets should be included in an asset-based wealth index that can be used as a control variable in research in rural Ethiopia? The availability of household data on both assets,

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[3] Moser (1998) addresses this question in a qualitative way while Filmer and Pritchett (2001) perform a robustness check on the type of assets included.

consumption and food security from the 1994/1995 round of the Ethiopian Rural Household Survey (ERHS) allows us to compare the relevance of five differently composed asset-based wealth indices and to explore geographical differences in terms of the importance of these assets. Looking at the factor loadings on assets, we find substantial differences across villages and argue for a location specific asset-based wealth index for studies at a disaggregated level. We also measure the effect of these five indices and per capita consumption on household food security, an important issue in Ethiopian livelihoods. In this paper, we use a self-reported food security measure, counting the number of weeks in a typical year that households have substantially less to eat than otherwise. The specified asset index performs best compared to the other indices when considering the distribution of food security across wealth quintiles and is at least as good a predictor of food security compared to per capita consumption measure for the same households.

The remaining part of this paper is organised as follows. Section two elaborates on the use and composition of asset-based indicators of wealth in the literature. Section three describes the data and methodology. In section four, we present five different wealth-indices while section five discusses geographical differences in terms of importance of assets. In section six, we use the asset-based wealth index to estimate the effect of economic status on food security. Section seven concludes.

2. Asset-based wealth indices

Economists have long relied on money-metric measures of income or consumption expenditures as indicators of poverty or living standards. These money metric measures are used as proxies for economic status. One of the most common criticisms of these measures is that they at best capture temporal dimensions of poverty as they measure consumption or income at only one point in time. For this reason, they may not reflect long-term economic status.[4] At the same time, collecting the information necessary to construct such a money metric measure is time consuming and especially in developing countries the data collection and metric construction is often constrained by measurement problems (Sahn and Stifel, 2003).

In the past decade, several studies have advanced an asset-based index as an alternative measure of economic status. See, for example, Sahn and Stifel (2000 and

[4] For a detailed discussion on the distinction between consumption expenditures and income as measures of household welfare, we refer to Deaton and Zaidi (2002) They argue consumption expenditures are a more precise measure of long term welfare compared to income, given the fluctuation in income streams, especially in rural areas where levels of income strongly depends on seasons and weather conditions while consumption is more smoothed over time.

2003), Filmer and Pritchett (1999 and 2001), Morris et al. (2000). The index used in these studies is a weighted sum of a defined set of household assets (including housing characteristics and durables) that is used to rank households and construct wealth quintiles. Compared to measures based on consumption, the data required to construct a wealth index are less demanding and the measure is simpler to calculate.[5] An asset-based wealth index may also capture dimensions of poverty not reflected in a one-time measurement of consumption or income, as is advanced by Sen (1985) in the capability approach or more recently in the livelihood-framework (see, for example, Ellis, 2000). More importantly, asset-based wealth indices have been shown to be at least as good predictors of outcome variables of interest such as nutrition or school enrolment, as are conventionally measured consumption expenditures (Filmer and Pritchett, 2001, Sahn and Stifel, 2003).

In most cases, the wealth index is used to compare outcomes across groups with different economic status, either at a national level or across countries, using nationally representative surveys. An index-based approach has, however, also been used at a more disaggregated level. See, for example, Janssens (2005) who uses a household asset index as a proxy for household wealth in measuring the externalities of a women's empowerment programme in the state of Bihar, India.

Filmer and Pritchett (2001) compare an asset-based wealth index with consumption expenditures and find a strong correlation between the index and per capita output and poverty. Yet, Sahn and Stifel (2003) argue it is not meaningful to consider the correlation between the asset index and consumption expenditures, as both are proxies for welfare and measure long-term wealth with error. Along these lines, they suggest it is more important to measure the impact on outcomes and evaluate the predictive power of asset-based wealth indices and consumption expenditures on child health and nutrition. Comparing indicators of relative measurement error[6], they show that the asset index they use measures long-term wealth with less error than expenditures. They suggest researchers may actually prefer to use the asset index as an explanatory variable in studies on economic welfare and capabilities such as health and nutrition.

Most of the asset-based wealth indices currently used in the literature consists of at least two sets of assets. The first is a set of household or housing characteristics, such as the availability and type of toilet facilities, type of water sources for drinking, type of building material used for walls, floors and roofs, access to electricity and the

[5] This is not to say that asset data are measured without error

[6] The indicator of relative measurement error is defined as the ratio of OLS to IV estimators of the two measures.

type of cooking fuel used. The second is a set of durable consumption goods whose ownership is expected to be indicative of wealth, such as a television, watch, refrigerator, bicycle, motorcycle, car, telephone, sewing machine and/or stove. Also, to varying degrees, other dimensions of wealth are included such as the education of the household head (Sahn and Stifel, 2000 and 2003), ownership of land (Filmer and Pritchett, 2001), the number of household members per room (Lindelow, 2002) and having a kitchen separate from bedrooms (Filmer and Pritchett, 2001).

The use of a standard list of assets is useful when comparing groups on a (cross-) country level, as it comprises information on what distinguishes the rich from the poor regardless of the place of residence (urban versus rural). In case one wants to use the wealth index as a control variable in an analysis at a lower level of aggregation, for example one village located in a poor rural setting, such a standard list including the ownership of durables such as a television or a car, may not be the most relevant. The challenge, then, is to define the assets relevant for the construction of a locally relevant wealth index.[7] In this paper, we explore this question for Ethiopia, where data from a large survey are available to allow comparison across localities and with a consumption measure.[8]

3. Data and Methodology

To construct and compare asset-based wealth indices and estimate the relation between long-term economic wealth and food security we use data from the Ethiopian Rural Household Survey (ERHS) collected in 1994 (two rounds) and 1995 (1 round) by the Department of Economics of Addis Ababa University in collaboration with the Centre for the Study of African Economies of Oxford University. The survey covers 20 sites and approximately 1450 households and captures many of the major socio-economic groups, agro-ecological zones and farming systems in Ethiopia. For more information on the dataset, we refer to Bigsten (2003) and Dercon (2004). The available data set covers a wide range of information, including asset ownership, food security and household consumption. We use information from different rounds to construct the asset-based wealth index and analyse a self-reported food security measure collected in 1995: the number of weeks in a typical year in which the

[7] Similar arguments are currently made in the literature on poverty lines based on Cost of Basic Needs (CBN) consumption measures where the use of a single consumption bundle to construct a national poverty line has shown to yield inconsistent poverty comparisons and the use of region-specific basic needs bundles is now advocated (Tarp et al. 2002).

[8] This data was used to select assets to construct an asset based wealth index for a study on intra-household risk coping, see Dekker (2008).

household has substantially less to eat than otherwise.[9] Data on asset ownership, housing and access to water were collected in the first round in 1994, while information on energy use and toilet facilities was asked in 1995. The aggregate household consumption measures used in this paper are constructed using the two 1994 rounds and have been provided by Bereket Kebede.

The construction of an asset-based wealth index is based on the assumption that wealth or economic status is a latent variable. We assume that economic status is the common factor behind the ownership of the assets, such that household economic status explains the maximum variance and covariance in the asset variables. Such factors can be extracted from a set of variables by creating a set of mutually uncorrelated components or factors of the data using principal component or factor analysis. The first linear component is that linear index of the underlying variables that captures most common variation among them. Each item, in our case asset, gets a different weight reflecting the contribution of this asset to the common factor. Principal component analysis only uses the variation in the variables that they have in common with other variables (communality), while factor analysis uses all the variability in a variable to extract the factors and also allows for a unique contribution of each of the assets (often referred to as uniqueness).[10]

In this paper, we will use both factor analysis and principal component analysis as outline below. Since we assume there is one common factor behind the ownership of the assets, household economic status, we use principal component analysis to derive the final weights for each asset (the factor loading) and to construct the index.[11] Ranking households on their score on the index then allows us to construct wealth quintiles where the first quintile represents the 20 percent of households with the lowest score on the wealth index the fifth quintile represents the 20 percent of households with the highest score on the wealth index.

[9] As respondents were asked to reflect on the situation of a "typical" year, rather than the situation they were experiencing at the time of the interview it is expected that this measure gives a more general impression of food security over time. It is however possible that the particular situation of a respondent in 1994 has affected the answer given to this question.

[10] Earlier studies have used both principal component analysis and factor analysis to derive the weights for the assets and construct the indices. Comparisons of the outcomes have shown no significant differences between the two methods (Sahn and Stifel, 2003, World Bank, undated).

[11] In practice, results obtained with factor analysis and principal component analysis are very similar.

Table 1: Variables used to construct wealth index in Young Lives Project Ethiopia[12]

Housing Quality	Consumer Durables	Services
Rooms/person *	Radio *	Electricity
Quality wall *	Fridge	Water *
Quality roof *	Bicycle	Sanitation *
Floor Durability	TV	Cooking Fuel *
	Motorbike/scooter	
	Motor car/truck	
	Mobile phone	
	Landline phone	
	Modern bed *	
	Table or Chair *	
	Sofa *	

Source: Alemu et al. (2003)
* Available in ERHS 1994/5

We will compare five asset-based wealth indices. First, the standard list of assets commonly used in the literature (see for example, Filmer and Pritchett, 2001). Second, the index used in the Young Lives project composed of the assets listed in Table 1. Third, an extended index including an extensive list of durables available in the ERHS. Based on the importance of particular assets in these three indices, we compose a fourth, specified index containing the most relevant assets in the rural Ethiopian context, using the uniqueness score calculated in factor analysis. Variables with low factor loadings and a high score on uniqueness contribute little to the common factor economic status and can therefore be excluded.[13] As a cut-off point, we use a uniqueness-score of 0.95: assets with a uniqueness-score higher than 0.95 will not be included in the index.[14] Finally, in the specified+ index we add information on the ownership of oxen, as this is an important productive asset in agriculture. As the sale of cattle may be an important consumption smoothing strategy, the results obtained with this index should, however, be interpreted with care.

The data set does not contain information on all assets that have been used elsewhere in the literature and not all asset variables are measured in the same way.

[12] Alemu et al (2003) used a slightly different approach compared to the studies mentioned above as the three components and different assets within the components received equal weights.

[13] This may be relevant for housing characteristics that are at least to some extent determined by the possibilities that are locally available; even wealthy households may not have a flush toilet or piped water sources when the technology (for instance, sewage or a tube system for water) is not locally available. This is especially relevant for toilet facilities, source of drinking water, electricity and to a lesser extent in relation to building material and cooking fuel.

[14] This cut-off point was empirically determined and is arbitrary. Future work should establish the sensitivity of the index to this cut-off point.

This may account for some of the differences we will find. It is also important to realize that the data used in this paper was collected more than 10 years ago and that over time, different or additional assets are indicative of long-term wealth or economic status, such as, for example, the mobile phone that is included in the asset-based wealth index used in the Young Lives project. Consequently, and also following from our subsequent analysis it will be important to have information on the situation in the particular site before deciding on the type of assets to be included in a survey instrument.

4. Assets and indices

Table 2 presents factor loadings and uniqueness-scores of the assets included in the five indices. These reflect the contribution of the variable to the common factor and the variation in the variable not in common with other assets respectively. The second column shows the scores on the assets that are commonly used in the literature on asset-based wealth indices, the standard index. We find high factor loadings on assets related to housing, with the clear exception of the availability of toilet facilities (latrine or flush), while the factor loadings on durables are relatively low. It should be noted, however, that the latter scores are comparable to the loadings on durables found by Filmer and Pritchett (2001); while the loadings on housing facilities found in the ERHS data are relatively high compared to other studies. Of the additional assets included in the so-called Young Lives Index (third column), only a bed seems to make a meaningful contribution to the wealth index. The factor loadings on sofa and table are low and the latter has a negative rather than an expected positive sign. The extended index presented in the fourth column includes a wide range of durables on which information is available. Most of these have a low factor loading and high uniqueness and therefore only marginally relate to our common factor economic status. Only a cart, a torch and a leather mat seem to be relevant. The latter is confirmed by qualitative information on asset-based wealth from Bevan and Pankhurst (1996).

Based on the uniqueness-score in these three indices, we constructed the fourth, specified index, by excluding toilet facilities and rooms per capita from the standard list of housing facilities and added cart, bed, torch and leather mat to the standard list of durables (fifth column). In the specified+ index in the sixth column, we also include oxen, an important asset in agricultural societies. The factor loading on oxen is considerable, reflecting a relevant contribution to the underlying factor. The eigenvalue-score reported that in the last row of Table 2 allows us to say something about the fit of the wealth index. It gives an indication on the proportion of the total variance in the asset variables that is captured by the factor extracted with principal

component analysis. The first factor derived in the specified index has an eigenvalue of 2.94, while the specified+ index has an eigenvalue of 3.02. In these cases, the eigenvalue of the first components is slightly lower compared to those reported for other African countries in Filmer and Pritchett (1999).

5. Geographical differences

The asset weights and indices discussed so far in this paper have been constructed and determined using the whole sample, covering 19 survey sites.[15] Given the diverse nature of the socioeconomic groups, agro-ecological environments and farming systems covered by the survey sites, it is expected that the assets included in an index will not be equally important in all sites. To explore these issues further, we compare factor loadings on the assets across the villages included in the sample on the specified index composed in the previous section. We extend this index with three assets from the standard list that appeared not to be relevant in the analysis presented in the previous section (toilet facilities, cooking fuel and the number of persons living in one room) to explore potential reasons for low factor loadings on these assets in the rural Ethiopian context. The village specific factor loadings are listed in Table 3. Comparing the loadings on assets across villages provide us with at least three important insights.

First, in each village some assets are dropped from the list such as piped water, a well, a leather mat or a cart. This is the case when there is no variation in ownership of that asset in a village, either because all households own/use a particular asset or because no one owns or uses the asset. When conducting an analysis at a national level, this is not problematic as there is still variation in ownership across villages. At a village level however, the number of assets on which the index is based will reduce and one may want to think about adding assets that are locally relevant in distinguishing wealth differences.

Second, we see opposite signs on the factor loading for each asset across villages, meaning that ownership of an asset does not have the same type of effect in each of the villages. To some extent, this explains the low factor loadings on an asset at a national level; high positive loadings in some villages and high negative loadings in others single out into a low loading at a national level. One can, for example, compare the factor loadings on rooms per capita in village two and three. This means that an asset that is locally important in marking wealth differences between households does not get much weight in an asset-index used to capture wealth at a

[15] One site has been excluded from this analysis because of missing data on one or more of the variables included.

national level. Although this may not be problematic when interested in wealth effects at a national level, using the nationally representative weights at a disaggregated level will result in biased results. Moreover, excluding assets that do not contribute much to a factor at a national level may not be correctly reflecting the situation in a village.

Third, and related to this, even when most of the loadings on an asset have the same sign, the size of the loading can differ quite substantially across villages. This is for example the case for radio ownership that has a factor loading higher than 0.5 in village 10, 11, 12, 14 and 19, a particularly low factor loading in village 1, 2, 3, 5 and 8 and a low negative load in village 6 and 9. Similarly, there are considerable differences across villages in the variation explained by the first component and its eigenvalue.

These findings suggest one has to be careful in using a standard list of assets to construct an asset-based wealth index for the analysis of wealth differences at disaggregated levels. Assets that may be relevant to distinguish wealth differences at a national level may not provide a relevant distinction at a local level as ownership of that particular asset may not capture wealth differences in a specific locality.[16] It is, therefore, advisable to work with a list of assets that is more specified to the local situation. Additional information such as previously collected quantitative data or qualitative information on wealth dimensions will be essential in selecting the assets for a locally relevant index and possibly in constructing the data collection modules used in household surveys. [17]

6. Asset-based wealth indices and food security

In the previous sections of this paper, we have reviewed what assets could/should be included in an asset-based index for economic status in rural Ethiopia and discussed geographical differences in factor loadings on included assets across villages. We found the standard list of assets to proxy for economic wealth can be included in an analysis at a national level, but when the analysis is confined to a lower level of aggregation, especially when covering only one village, the standard list may not be sufficient. In such a case, the researcher should construct a locally relevant list of

[16] Another issue relevant to the level of aggregation is intra-household differences in wealth. Distinguishing wealth differences within the household will require even more detailed information about the local situation.

[17] Alternatively and when available, a comparison to consumption data can be made, and the asset-based wealth index may be used as a complement to consumption data. This paper however refers to a situation when no consumption data is available or when consumption data will not be collected.

assets, for example, by taking the relevant items from the standard list and extend it to include location specific assets.

To move away from the composition of the asset-based wealth index *per se*, and following Sahn and Stifel (2003) we turn to the use of an asset-based wealth index in estimating wealth differences in outcomes in this section and make a first comparison of outcomes and estimations based on asset indices with those based on per capita consumption. In this case, we focus on the relationship between wealth and self-reported food security, the number of weeks in a typical year that a household has substantially less to eat than otherwise. Of the 1404 households in the sample who answered this question, only 17 percent indicated they did not have any week in which they had substantially less to eat in a typical year. Of those who did report temporal food shortages, the average number of weeks was 13.3, with a minimum of 2 and a maximum of 52. The average number of weeks with substantially less to eat differs greatly across villages, ranging from 4.5 to 18 weeks.

A first glance on the relation between household economic status and food security is provided in Table 4. In this table, we list differences in the mean number of weeks in a typical year that a household has less to eat per wealth quintile, and expect to find a decreasing number of weeks with increasing wealth. We constructed six sets of quintiles, five sets based on the asset-based wealth indices discussed in section four and for comparison one set based on per capita consumption figures (the mean per capita consumption as measured in the two rounds in 1994). The distribution based on the standard asset list of quintiles shows the mean number of weeks a household has substantially less to eat decreases per quintile, although there is no difference between the second and the third quintile. The distributions based on the Young Lives, Extended Assets and Specified Asset-indices provide counter-intuitive results; the mean number of weeks for households in the third quintile is higher compared to those on the second quintile or even the first quintile (Young Lives). This is not the case for the specified assets-index including oxen, where the distribution of the number of weeks descends for the richer quintiles. For all asset-based indices, the mean scores for the three poorer quintiles are much closer together compared to the two richer quintiles.

In comparison, the mean number of weeks calculated for per capita consumption quintiles also shows the expected pattern; for each quintile the number of weeks in a typical year in which the household has substantially less to eat decreases when wealth, proxied by per capita consumption, goes up. The mean number of weeks in the fifth quintile, 9.2, is, however, substantially higher compared to the mean number of weeks based on the asset-based wealth indices.

To investigate the relationship between wealth and food security further, we perform a number of descriptive regression analyses. We regress the number of weeks in a typical year that a household has substantially less to eat on a number of explanatory variables, including wealth indices. We perform six regressions to compare the predictive power of the five asset-based indices and per capita consumption. Apart from the wealth indices, we also included the total acreage of land a household has access to, indicative of its potential to produce food, the size of the household and a set of village dummies that capture amongst others regional differences in food producing potential. We expect richer households as well as households with more land to report a lower number of weeks with substantially less food (a negative coefficient) while larger households are expected to have a higher number of weeks with less food, given the fact they have more mouths to feed. As we use count data, the number of weeks in a typical year, we use a Poisson regression model.

The results are presented in Table 5. The sign on total land owned cannot be interpreted as it is not estimated with sufficient precision. The coefficients on household size and wealth have the expected sign and are significant, with the exception of household size in the per capita consumption regression. This suggests indeed that households with higher economic status experience fewer weeks with substantially less food than otherwise, relative to households with a lower economic status. The differences between the regression results of the five different wealth indices and per capita consumption are small, with slightly higher coefficients (and more precision in estimation of the coefficient and the model fit) for the two specified indices. Given the explorative nature of these analyses, the results should be interpreted as preliminary only. These preliminary results do, however, confirm the findings of Sahn and Stifel (2003) that asset-based indices of wealth are at least as good a predictor of outcomes as are expenditures.

From the analysis presented above it is not exactly clear how to interpret the exact relationship between economic status and food security. There may be a direct link between assets and food security as assets can be used to smooth consumption over time, as a source of income or by selling them. However, the assets included in the index are not those typically sold or used to generate income in response to food shortages or other shocks.[18] Alternatively, and in line with the argument of this paper, the ownership of assets signals economic status. In that case, higher economic status, reflecting for example higher (non-farm) income, may result in more and better options to smooth consumption. The analysis needed to unravel the precise

[18] The literature on buffer stocks predominantly refers to cattle as an important asset to be sold in times of stress (see for example Rosenzweig and Wolpin, 1993, and Kinsey, Burger and Gunning, 1998). If productive assets, such as cattle, are sold to smooth consumption, future food security may be put at risk.

mechanism behind the relationship between wealth and food security is beyond the scope of this paper. Yet, if these results were to be confirmed in other studies, a case could be made for using asset-based indicators of wealth to target of public interventions, whether on food security or in other fields. In such case, community-based (or district-based) targeting is likely to be most suitable to take the geographical differences in the ownership of specific assets into account.

7. Conclusion

This paper explored some issues related to the use of an asset-based wealth index as a proxy for long-term household economic status and extended the use of asset-based wealth indices to food security. In particular, we addressed the potential composition of an asset-based wealth index and considered the influence of geographical differences in asset-ownership and the relevance of the standard list of assets used in the literature for the context of rural Ethiopia.

To this end, we used ERHS data on asset ownership to construct five different asset-based wealth indices and compared the factor loadings on the assets included, both at a national level covering 19 villages and on a village-by-village basis. The standard list of assets used in an index to compare economic status across different communities in one country or across countries may be useful. However, some dimensions of wealth, such as the type of drinking water facilities or the type of building material used, are to some extent determined by the community or environment in which one lives. For this reason, the standard list may not be the most relevant list to capture wealth differences between households or individuals living in one community. A list of assets that is more specified to the local situation is, therefore, advisable. Additional information, such as previously collected quantitative data or qualitative information on wealth dimensions is, therefore, essential in constructing such an index and the data collection modules underlying it.

We also looked at the predictive power of an asset-based wealth index in explaining differences in food security. We find that households with a higher economic status experience significantly fewer weeks of food insecurity compared to households with a lower economic status. Moreover, the results suggest the relation between household economic status and food security is measured at least as precisely when we use an asset-based index of wealth compared to a wealth proxy defined as per-capita consumption. In such case, a well-defined list of assets may provide policy makers with an opportunity to distinguish households capable of smoothing consumption from those who are not, making it easier to target food security interventions.

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Table 2: Factor loadings and uniqueness scores on assets for five different wealth indices

Assets included in the index:	Wealth index: standard assets		Wealth index: Young Lives Project		Wealth index: Extended ERHS asset list		Wealth index: specified asset list		Wealth index: specified +	
	Load	Uniq	Load	Uniq	Load	Uniq	Load	Uniq	Load	Uniq
Toilet	0.028	0.999	0.022	0.999	0.028	0.999				
Piped	0.566	0.680	0.540	0.708	0.575	0.670	0.569	0.676	0.551	0.697
Well	0.286	0.918	0.287	0.917	0.238	0.943	0.253	0.936	0.271	0.927
Open water	-0.594	0.647	-0.577	0.667	-0.574	0.671	-0.578	0.666	-0.562	0.685
Fuel	0.191	0.963	0.187	0.965	0.190	0.964				
Iron roof	0.653	0.574	0.642	0.588	0.637	0.594	0.654	0.572	0.652	0.575
Thatch roof	-0.577	0.667	-0.566	0.680	-0.571	0.674	-0.575	0.669	-0.563	0.683
Mud wall	0.731	0.465	0.747	0.441	0.728	0.471	0.724	0.476	0.725	0.474
Wood wall	-0.734	0.462	-0.750	0.437	-0.735	0.459	-0.722	0.479	-0.711	0.494
No. residents per room	-0.126	0.984	-0.117	0.986	-0.112	0.987				
Radio	0.258	0.933	0.262	0.932	0.265	0.930	0.272	0.926	0.294	0.914
Watch	0.221	0.951	0.225	0.949	0.205	0.958	0.221	0.950	0.242	0.942
Bed			0.251	0.937	0.209	0.956	0.220	0.950	0.265	0.930
Table			-0.1823	0.967	-0.181	0.967				
sofa			0.035	0.999	0.020	0.999				
Cart					0.215	0.954	0.227	0.949	0.248	0.938
Torch					0.249	0.938	0.278	0.939	0.248	0.939
Mill					0.025	0.999				
Cup-board					-0.042	0.998				
Pouch					0.036	0.999				
Weaving equipment					0.008	0.999				
Leather Mat					0.367	0.865	0.363	0.868	0.315	0.901
Oxen									0.345	0.881
Eigenvalue first factor	2.76		2.83		3.00		2.94		3.02	

Source: ERHS

Table 3. Factor loadings on asset index across different villages (numbered 1-20).

Asset	1	2	3	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Piped	0.781	-	0.052	-	-	0.107	0.187	-	-0.399	0.713	0.063	-0.214	-0.106	0.221	-	-	0.187	-	-0.017
Well	0.150	0.236	-	0.500	0.851	-0.112	-0.028	0.544	-	-	0.604	-	-0.047	-	-	-	-	-	-
Open water	-0.779	-0.408	-0.179	-0.530	-0.268	0.042	-0.102	-0.544	0.579	-0.633	-0.280	0.303	0.074	-0.437	-	0.583	-0.473	-0.492	0.659
Iron roof	-	0.034	-	0.727	0.842	0.830	0.817	-0.086	0.829	0.634	0.304	0.885	0.734	-0.566	-	-0.433	0.494	-0.514	0.428
Thatch roof	-	-0.691	0.702	-0.685	-0.704	-0.767	-0.818	0.585	-0.802	-0.634	-0.517	-0.807	-0.741	0.665	-	0.462	-0.369	0.125	-0.823
Mud wall	-0.316	0.391	0.869	0.755	0.847	-0.587	-0.361	-0.818	0.185	0.675	-	-0.040	0.701	0.430	-0.976	-0.486	0.707	0.740	0.515
Wood wall	0.250	-	-0.474	-0.755	-0.805	0.337	0.363	0.854	-0.166	-0.675	-	0.040	-0.701	-0.468	0.976	0.727	-0.351	-0.760	-
Radio	0.076	0.041	0.046	0.088	-0.045	0.495	0.021	-0.023	0.599	0.503	0.842	-	0.682	0.200	0.084	-0.210	0.473	0.634	-0.091
Watch	0.351	0.336	0.494	-0.424	0.373	0.191	0.420	-0.065	0.284	0.661	0.588	0.682	0.344	-0.166	0.054	-0.313	0.093	0.320	0.059
Bed	-0.128	-	-0.393	0.656	0.356	0.308	0.479	-0.150	0.528	0.492	0.808	0.190	0.395	0.351	0.017	-0.435	0.502	-0.405	-0.256
Leather mat	0.520	0.150	-	-	-	-0.191	-0.270	-	-	-	0.381	-	-	-	-	-	-	-	-
Torch	-0.053	0.728	-0.291	0.289	-0.108	0.539	0.314	-0.119	0.298	0.122	0.381	0.605	0.060	0.199	0.193	-0.195	-0.455	0.149	0.606
Cart	-	-	-	-	-	0.529	-	-	0.654	0.511	-	-	-	-	-	-	0.133	0.450	-
Toilet	-0.090	-	-0.091	-	-	0.364	0.237	0.169	0.560	0.726	0.358	0.336	0.167	0.065	-0.306	0.570	-	-	0.211
Fuel	0.198	-0.385	0.112	0.159	-0.146	0.196	0.251	0.129	0.187	0.675	0.186	-	0.216	0.207	-0.070	-0.595	0.272	0.174	-0.659
Rooms pc	-0.205	0.398	0.549	-0.333	0.075	0.122	-0.192	0.114	0.242	0.023	-0.166	0.068	-0.190	0.387	0.167	0.378	-0.116	-0.215	-0.211
Proportion	0.15	0.17	0.19	0.29	0.31	0.18	0.16	0.19	0.25	0.34	0.24	0.23	0.21	0.14	0.23	0.22	0.16	0.22	0.21
Eigenvalue	1.91	1.83	2.31	3.5	3.67	2.93	2.38	2.44	3.53	4.82	2.84	2.56	2.94	1.83	2.10	2.70	2.06	2.62	2.53

Source: ERHS

Notes: the numbers in the column represent the villages in the ERHS.

Table 4: Relation between asset-index and food security: mean number of weeks with substantially less to eat per wealth quintile based on the different type of indices

Type of index	First quintile	Second quintile	Third quintile	Fourth quintile	Fifth quintile
Standard	13.1	12.6	12.6	10.0	7.0
Young Lives	13.0	12.5	13.2	10.1	6.7
Extended Assets	13.0	12.6	13.0	9.6	7.2
Specified	13.6	12.2	12.7	9.5	7.3
Specified +	13.5	12.6	12.3	9.8	7.1
Percapita consumption (mean)	13.6	12.3	10.4	9.8	9.2

Source of data: ERHS

Table 5: Poisson regression of the number of weeks in a typical year that a household has substantially less to eat, random effects model

	Standard	Young Lives	Extended	Specified	Specified +	Pc cons[§§§§§§§]
Total land	-0.002 (-0.59)	-0.002 (-0.49)	-0.002 (-0.48)	-0.002 (-0.50)	-0.000 (-0.05)	-0.002 (-0.62)
Household size	**0.013 (4.40)**	**0.014 (4.40)**	**0.014 (4.35)**	**0.012 (3.95)**	**0.015 (4.71)**	0.005 (1.74)
Wealth	**-0.193 (-13.02)**	**-0.195 (-13.12)**	**-0.203 (-13.30)**	**-0.212 (-14.18)**	**-0.230 (-15.41)**	**-0.027 (-4.68)**
Pseudo R-squared	0.1915	0.1917	0.1920	0.1938	0.1964	0.1816
Observations	1399	1399	1399	1399	1399	1399

Source of data: ERHS

Notes: Village dummies included, coefficients not reported in the table.

t-values in brackets

Bald figures are significant at 0.05 level

§§§§§§§ In 1000 birr