Community Wealth-Ranking and Household Surveys: An Integrative Approach

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1. Introduction

Traditionally participatory methods of analysis like wealth ranking exercises were favoured mainly by sociologists and development practitioners. But the use of participatory methods in conjunction with other more formal methods has increased recently. This is particularly true in poverty studies that focus on understanding of rural livelihoods in developing countries. For example wealth ranking was used to divide the population into non-poor, poor and ultra-poor for the purpose of constructing a poverty index that used both qualitative and quantitative information in Iran (Dariush Hayati et al., 2006). Rosemary McGee used participatory method to understand the dynamics of poverty in Uganda in the recent past to contribute to the debate whether poverty has increased or decreased (Rosemary McGee, 2004). Wealth rankings were also used to understand destitution and poverty in Ethiopia (Stephen Devereux and Kay Sharp, 2006, Kay Sharp et al., 2003), to examine villagers' perception of poverty in Zimbabwe (Trudy Owens, 2004), to develop an asset status tracking method in India (Richard Bond and Neela Mukherjee, 2002), to assess child poverty in rural Vietnam (Trudy Harpman et al., 2005) and analyse poverty among tribals in India (Amita Shah and D. C. Sah, 2004).

In addition to poverty analysis, wealth ranking has also been used in very different research and assessment exercises usually in combination with other research methods. It has been used to study biodiversity and recent changes in *enset* (false banana) production in Ethiopia (A. Tsegaye and P. C. Struick, 2002); to identify different approaches used by research and service providers in technology dissemination for different wealth groups in Uganda (G. Agwaru et al., 2004); to choose appropriate response by public health sector to reduce acute malnutrition among children in Cambodia (Bart Jacobs and Emma Robers, 2004); to understand the direct use-value of bio-resources in rural households in South Africa (W. Twine et al., 2003); to analyse the diversity in livelihoods and farmers strategies in eastern Ethiopia (Tesfaye Lemma Tefera et al., 2004); for the economic analysis of animal genetic resources (Adam G. Drucker and Simon Anderson, 2004); for mapping and understanding indigenous farmers agricultural knowledge and information system and implication to extension services (H. Bagnall-Oakeley et al., 2004); to analyse the sustainability of participatory watershed development in India (V. Ratna Reddy et al., 2004); to indentify smallholders soil fertility management in Ethiopia (Amare Haileslassie et al., 2006); to assess the effect of abolishment of user fees in health services in Uganda

(Jenny Yates et al., 2006); to ascertain whether microfinance reaches the poor in South Africa (Anton Simanowitz, 2000); to examine if the quality of science is affected by participatory research (Christina H. Gladwin et al., 2002); to monitor the impacts of community forestry on livelihoods in Nepal (Om Prakash Dev et al., 2003); to trace the effect of community heterogeneity on community based forest projects in Nepal (Bhim Adhikari and Jon C. Lovett, 2006); to examine the inequity in the distribution of responsibilities in Forest User Groups in Nepal (Michael Richards et al., 2003). In most cases, wealth ranking is used as part of a broader participatory method and complemented with other quantitative-oriented research methods.

Apart from the use of participatory research methods in many contexts, a lively debate on the methodological validity of participatory methods including wealth ranking has developed (John Campbell, 2002; Caterina Ruggeri Laderchi et al., 2003; Linda Mayoux and Robert Chambers, 2005; Alayne M. Adams et al., 1997; Trevor Parfitt, 2004).

The main focus of this paper is on the use of information from wealth ranking exercises in conjunction with data collected from household surveys. The second section outlines a simple conceptual framework for a more systematic analysis of wealth ranks with information from household surveys. Section 3 provides a brief description of the empirical data used. Section 4 presents the main empirical results while Section 5 provides conclusions.

2. Conceptual framework

This section outlines a simple framework for analysing wealth ranks collected through participatory community methods and using them in combination with household survey data.

Let x_{ij}^{k} represent the amount of a specific resource j (j = 1, 2, …, m) a household i (i = 1,2, …,n) has in cluster k (k = 1, 2, …, p). The resources indexed by j represent human and material resources or other characteristics of households; these can be income, land ownership, household size and similar household characteristics. The clusters indexed by k represent a geographical area in which households under study are located; for example, the cluster may be defined by households located in the same district, sub-district or village. Generally, we expect similarity in farming systems, culture and other social characteristics among households located in the same cluster than between those in different clusters.

Information from a single household can be summarised in a 1xm vector, each element representing the amount of resources owned by the household. The data from all households in a cluster will constitute an nxm matrix (n households with m resources); let us call this matrix $\boldsymbol{X}$.

When people knowledgeable about the community wealth rank households, they use weights which reflect the importance of each resource contained in the matrix $\boldsymbol{X}$.[1] Let the mx1 vector containing these weights equals $\boldsymbol{w}$ and let the wealth ranks of households in a cluster be captured by an nx1 vector $\boldsymbol{r}$. Hence,

$$\boldsymbol{r} = \boldsymbol{X} * \boldsymbol{w} \qquad \ldots (1)^2$$

Researchers at least partly observe the matrix $\boldsymbol{X}$; standard household surveys routinely collect information on household level characteristics. Obviously, there is no guarantee that the information gathered by household surveys will cover all the resources considered important in wealth ranking; some resources considered in wealth ranking may not be covered and others that are not considered in wealth ranking may be included.[3] But as can be gathered from the description of factors considered by people in wealth ranking, there is obviously a lot of overlap; when people involved in wealth ranking are asked what factors they considered, such factors like land and livestock ownership are routinely mentioned.

Even though researchers can observe, at least imperfectly, the resources of households (matrix $\boldsymbol{X}$) generally they have no information on the weighting system $\boldsymbol{w}$. In wealth ranking exercises, as indicated above, people are asked what factors they considered but they do not provide an explicit weighting system which translates the resources of households into wealth ranks. Hence, the question is can researchers identify, at least partially, the weighting system?

The weighting system $\boldsymbol{w}$ obviously reflects the social value people attach to these resources. The social values of resources in turn are affected by a host of factors. First, resources with more economic value will be given more weight. For example, in a rural

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[1] The weighting function used by the wealth rankers probably represents a consensus in the community.

[2] To simplify discussion, here we have considered only one cluster. But if all households in all clusters are considered and if the weights used in wealth ranking differ by clusters – as we generally expect – the matrix of resources for each cluster should appear on the main diagonal of the matrix containing information on all households and the off-diagonal elements should be zero. Correspondingly, the dimension of the weighting vector $\boldsymbol{w}$ becomes *(kxm)x1*, *k* capturing the different weights for the same resource in the different clusters.

[3] More work on the effect of the inclusion of irrelevant variables and the exclusion of relevant ones on using wealth ranks and data from household surveys is required. Apparently, their effects are equivalent to problems of including irrelevant and omitting relevant variables discussed in standard econometrics.

area heavily depending on agriculture, one would expect more weight attached to land. Similarly, in a farming system that heavily depends on livestock draft power, the weight given to livestock ownership is expected to be high. Let EV_j represent economic value of the resources in cluster *j*.

In addition to economic values, resources can also have what we may generally call 'cultural value' apart from their roles as inputs into production. Some resources may have symbolic value. For example, in addition to being important sources of draft power, meat and milk livestock in many communities are also status symbols. Certain religious and other beliefs may attach a value to resources that are not directly related to their economic value. Let CV_j stand for the 'cultural value' of resources in cluster *j*.

Researchers can get an idea of the economic and 'cultural values' of the resources from detailed descriptions of farming systems and cultures of communities. But a profound understanding of how economic and 'cultural values' in specific communities affect weights in wealth ranking will require detailed, specific and local knowledge – this is generally beyond the reach of most researchers unless there are anthropological/sociological studies.

In addition to the above, the weights will also be influenced by other factors. For example, the relative abundance of resources will most likely affect them. In a community where both land and livestock are important for agriculture one would expect a higher weight given to that resource in relative shortage; if livestock is in shortage relative to land, one would expect livestock receiving more weight. Let's lump all other factors influencing the weights into ε.

Suppose data from household surveys are available for the same communities covered by wealth ranking; in terms of our designation, at least some of entries in matrix $\boldsymbol{X}$ are captured by the household survey. The question that motivates this paper is, using household survey data in conjunction with wealth ranks, is it possible to have a better idea of the weighting system without detailed sociological/anthropological information?

The hypothesis of this paper is that observability/visibility of the resources play an important role in determining wealth ranking weights. There are two reasons for this. First, it is likely that the visibility of resources influences decisions of people doing the wealth ranking. Remember, these people are asked to rank a household which has different types of resources some of which are more visible than others; for example, livestock ownership is more visible than income or savings. One would expect the wealth rankers to give more weight for the more visible resources by the mere fact that their knowledge about them is better than less visible resources. Hence, given equal economic and social values of two resources, one would expect higher weight for that resource that is more visible.

Secondly, and more substantively, the 'cultural value' of resources is expected to be positively affected by visibility; in most cases, to be socially important resources should be visible to other members of the community. For example, a resource becomes a status symbol only if it can be observed by others.

In addition to the importance of visibility, the focus on it has the added advantage that researchers have an a priori knowledge – though imperfect – of the degree of visibility of different resources. For example, one need not collect detailed local information to know that livestock ownership is more visible than income or savings; researchers can have a pretty good idea which resources are more visible. Of course, it is generally impossible to have a clear ranking of resources according to their visibility.

Let $\boldsymbol{v_i}$ represent the visibility of resources. Probably, it is better to think of it as rank order of resources according to their visibility. One would not expect a complete ranking, only partial ranking. As discussed above first visibility directly affects wealth ranking by influencing the decisions of people involved in ranking $\left(\frac{\partial w}{\partial v_i^k} > 0\right)$. But in addition, it affects wealth ranking indirectly by influencing the 'cultural value' of resources $\left(\frac{\partial w}{\partial CV}\frac{\partial CV}{\partial v_i}\right)$. The weightings used in wealth ranking can be presented in the following form given visibility of resources:

$$w=f(EV,CV,\varepsilon;v) \text{ with } \frac{\partial w}{\partial EV} > 0; \frac{\partial w}{\partial CV} > 0 \qquad \text{... (2)}$$

Let's further explore how visibility of resources can help us better understand wealth ranks. As indicated above, due to lack of information researchers don't directly observe equation (2). Suppose wealth ranks are regressed on different amounts of resources households have as captured by household surveys and the weights for each resource estimated from the regression are $\widehat{w}_i$ (i = 1, 2, …, j).

$$w = \widehat{w}_1 x_1 + \widehat{w}_2 x_2 + \ldots + \widehat{w}_j x_j \qquad \text{... (3)}$$

First, let's consider two resources, *i* and *j* where $i \neq j$. The weights from regression (3) and the degree of visibility of the two resources are either equal or unequal. Table 1 provides the possible combinations and the associated expectations the values of the two resources.

Table 1: Predictions of total value of resources for different visibility and estimated weights

for *i* ≠ *j*	$\widehat{\mathbf{w}}_i > \widehat{\mathbf{w}}_j$	$\widehat{\mathbf{w}}_i < \widehat{\mathbf{w}}_j$	$\widehat{\mathbf{w}}_i = \widehat{\mathbf{w}}_j$
$\boldsymbol{v_i > v_j}$	?	$EV_i+CV_i<EV_j+EV_j$	$EV_i+CV_i<EV_j+EV_j$
$\boldsymbol{v_i < v_j}$	$EV_i+CV_i>EV_j+EV_j$	?	$EV_i+CV_i>EV_j+EV_j$
$\boldsymbol{v_i = v_j}$	$EV_i+CV_i>EV_j+EV_j$	$EV_i+CV_i<EV_j+EV_j$	$EV_i+CV_i=EV_j+EV_j$

If the regression estimated weight of a resource is higher but its visibility is lower than or equal to another, most likely it has higher economic and 'cultural' value than the other resource (higher weight given to the resource). If the resources' estimated weights and visibility have the same ordering (both greater for one resource), it is difficult to say in what manner the economic and 'cultural' values of the two are related. People may have given higher weights to the resource merely because it is more visible. The relationships summarised in Table 1 show that interpreting the regression coefficients without taking into account visibility of resources may be problematic.

Now let's consider the same resource. It is realistic to assume that a resource has the same level of visibility in all clusters. Suppose a regression similar to (3) is run on cluster level *k*.

$$w_k = \widehat{w}_{1k} x_{1k} + \widehat{w}_{2k} x_{2k} + \ldots + \widehat{w}_{nk} x_{nk} \qquad \ldots (4)$$

Since a resource is equally visible across different clusters, if the same resource is given different weights in different clusters, those differences should reflect variations in economic and 'cultural' values. Formally, for *k* and *l* indexing different clusters,

$$\text{since } v_i^k = v_i^l, \text{ for } k \neq l, \text{ if } \widehat{w}_i^{\,k} > \widehat{w}_i^{\,l} \Rightarrow \left(EV_i^k + CV_i^k\right) > \left(EV_i^l + CV_i^l\right) \qquad \ldots (5)$$

The empirical part of the paper uses these within and between cluster variations to identify the economic and 'cultural' values of resources in different districts in rural areas of four east African countries. Before presenting the empirical results the next section describes the data source.

3. Data

This paper uses the LADDER data set. LADDER stands for Livelihoods and Diversification Directions Explored by Research. The research project was funded by the Policy Research Programme (PRP) of the Department for International Development (DFID) and lasted for four years from April 2000 to March 2004; it was mainly coordinated by the School of Development Studies at the University of East Anglia. The fieldwork surveyed thirty seven villages in ten rural districts of four east African countries: Uganda, Kenya, Tanzania and Malawi. Around 1,300 households were surveyed in all the four countries. Locations of districts covered by the fieldwork are given in Figure 1.

Selection of sites was made on the basis of representativeness as well as the attempt to capture variations in rural livelihoods. Within each village, a PRA (Participatory Rural Appraisal) wealth-ranking exercise was conducted, resulting in the identification of three wealth groups that acted as the sampling frame for a stratified random sampling for a household survey (F. Ellis and H. A. Freeman, 2004). These quantitative and qualitative data collected by the LADDER project are used in this paper. Estimation and the main results from the analysis are presented in the next section.

4. Estimation and empirical results

The empirical analysis examines the correlation between wealth ranks of households and different types of resources owned by them using the insights presented in Section 2. Whether a priori knowledge of the observability/visibility of resources will enlighten us on the weighting systems used in wealth rankings will be examined. This will help our understanding of economic and 'cultural' values of resources among rural communities of eastern Africa in particular and help to more systematically analyse information from participatory wealth ranking exercises in conjunction with data from household surveys in general.

Table 2 provides basic descriptive statistics on the variables used in estimation. Community wealth-ranking placed around 43% of households in the poor group; this figure is not far from many head count poverty figures computed using quantitative consumption data for many African countries. Around 29% of households were placed in the middle and rich wealth groups each.

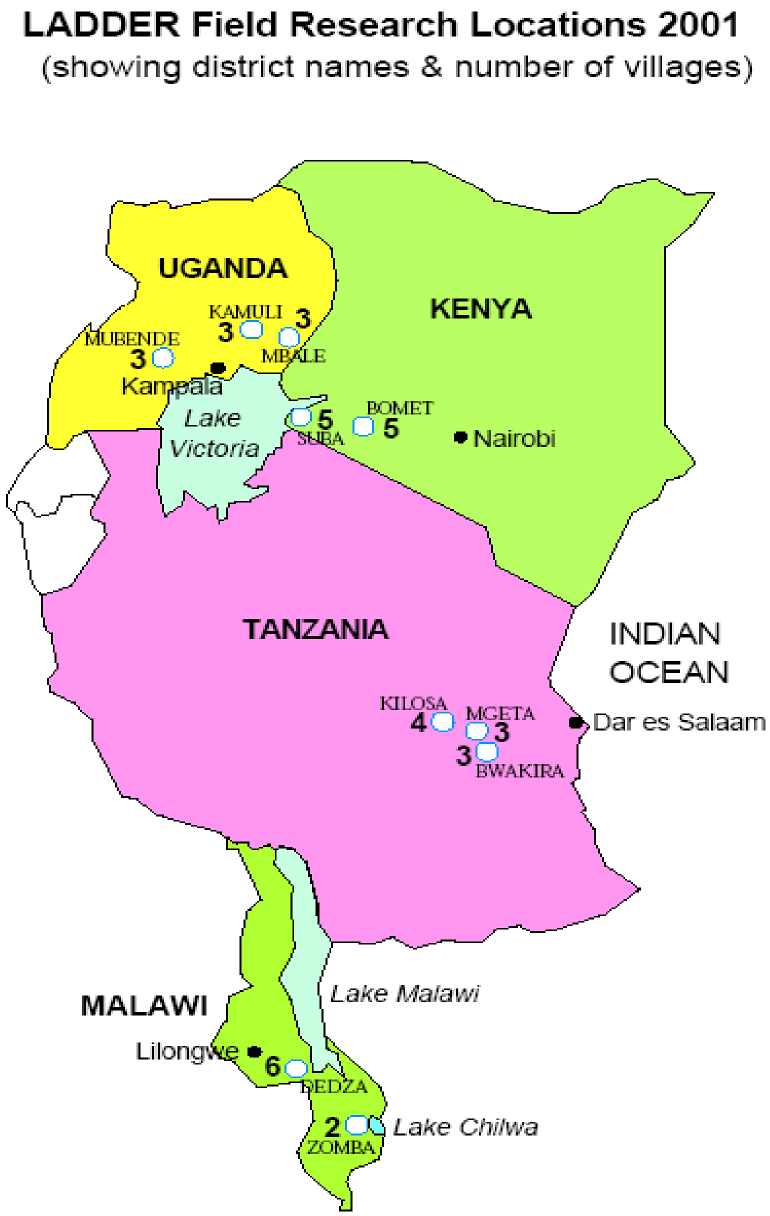

Figure 1: Location of LADDER sites

LADDER collected detailed information on different sources of household income; the mean, median and standard deviation of income from different sources is given in Table 2.[4] Detailed information on inputs used was also gathered. By deducting costs of inputs from gross income, net income is computed. The statistics reported in Table 2 are annual net incomes per household. The average figures for different forms of income indicate that households derive more income from non-farm activities than from the farm. Even though these average figures indicate the importance of non-farm activities among rural households in East Africa, they are also a bit misleading. As can be seen from the median and standard deviations, the figures for non-farm income are characterised by a very low median and very high standard deviation; this is an indication that most of the non-farm income is controlled by relatively small number of households. The figures also highlight the relatively diversified nature of rural livelihoods; sources of income other than agriculture play important roles.

Mean, median and standard deviation of indicators of different types of assets are also given. The very low ownership of livestock is immediately apparent; for example, even though the mean figures are not very low, the majority of households do not have any livestock (cattle, goat or sheep), as indicated by the median. In addition to livestock, shortage of land is also apparent; for example, the median land holding size of households is only 1 ha. In spite of large family sizes – with 5.1 and 5 mean and median household size respectively – there are only two adults in a household (when using median) implying high dependency ratios. Given the shallowness of labour markets, this could give rise to acute shortage of labour.

Indicators of types of houses, utilities people have access to and types of their employment can be good proxies for the economic positions of households as well as their status in the community. To capture some dimensions of housing, whether houses have corrugated iron roof and whether the walls are built from bricks are reported. 42% and 19% of the houses have corrugated iron roof and brick walls respectively, with median figures being zero for both. In addition, only 13% of the families have access to piped water and 16% of household heads were employed in parastatals, government organisations, the private sector and non-farm self-employment.

[4] LADDER didn't gather detailed information on household expenditures in contrast to most household surveys.

Table 2: Descriptive statistics

	Frequency	Percent	Cumulative percent
Wealth groups			
Poor	556	42.93	42.93
Middle	369	28.49	71.43
Rich	370	28.57	100.00
	Mean	**Median**	**Standard deviation**
Income (US$)			
Crop	188.34	71.37	373.82
Livestock	111.03	8.80	393.16
Natural resources	66.76	0.00	389.66
Non-farm	268.67	28.08	1015.10
Remittance	16.25	0.00	69.07
Rent	0.81	0.00	7.87
Fishing	106.10	0.00	817.83
Livestock (numbers)			
Cattle	2.55	0.00	15.95
Goat	1.81	0.00	4.85
Sheep	0.46	0.00	3.62
Land owned (ha.)	1.58	1.01	1.84
Asset value (US$)	117.11	44.15	596.46
Adults 15-65	2.38	2.00	1.35
Corrugated iron roof	0.42	0.00	0.49
Brick wall	0.19	0.00	0.39
Employee	0.16	0.00	0.36
Water pipe	0.13	0.00	0.37

Note: 'Employee' stands for household heads working in parastatal or government organisations, in private sector and non-farm self-employment

To examine the correlation between wealth ranks and the different socio-economic characteristics of households ordered logit is used where the wealth categories poor, middle and rich are the dependent variable. All variables in Table 1 were not included due to multicolinearity. Income from livestock, numbers of cattle, sheep and goat were strongly correlated with each other because of obvious reasons; hence, only the number of livestock is included in the regressions as it is probably a variable with less measurement error and is more visible. Income from non-farm activities and the variable 'employee' are also correlated; only the value of non-farm income is included first because it covers more sources than the dummy variable and since information will be lost using a dummy variable instead of a continuous one.

First the ordered logit is run on pooled data. The results, in terms of odds ratios, are given in Table 3. Since we expect unobservable factors affecting wealth ranks to be mainly district level fixed effects – like farming system characteristics and culture – in addition to the independent variables district dummies are included (not reported). Robust standard errors are used to minimise the effect of heteroscedasticity.

Table 3: Odds ratios from ordered logit regressions of wealth ranks (pooled data)

	Odds ratios	**Robust z-statistics**	**Standardised coefficients**
Income			
Crop	1.106	2.33**	1.20
Natural reso.	0.950	1.66*	0.90
Non-farm	1.050	2.04**	1.14
Remittance	1.014	0.37	1.02
Rent	0.755	1.48	0.87
Fishing	1.090	1.93*	1.18
Cattle	1.894	5.60***	1.75
Land owned	1.955	4.82***	1.45
Asset value	1.525	7.18***	1.83
Adults 15-65	1.973	4.16***	1.31
Corr. iron roof	2.510	6.54***	
Brick wall	1.621	2.63***	
Water pipe	1.195	0.70	
District dummies included but not shown here			
Observations	1295		
Wald chi-square	373.61***		
Pseudo r2	0.19		

Note: All continuous variables in natural logarithms; 'Employee' stands for household heads working in parastatal or government organisations, in private sector and non-farm self-employment; * significant at 10%; ** significant at 5%; *** significant at 1%

In Table 3 while the first set of variables capture different forms of income, the second set give information mainly on ownership of assets and on adult labour. Assets and adult labour are more observable or visible and, according to our conceptual framework, will be more correlated to wealth ranks compared to less visible resources unless the latter are comparably more socially valuable. The results in Table 3 support this. Except for water pipe, all the other non-income variables are highly significant (at 1%) and the odds ratios are consistently greater than one; in contrast, only two of the income variables are significant at 5% while the other two are significant at 10% and the remaining two are not significant at all at conventional levels. Hence, overall more visible assets and number of adults – which are also highly visible – are given more weight in wealth ranking compared to less visible income.

Closer examination of the estimates confirms the importance of visibility of different sources of income. The more significant income-related variables (at 5%) are incomes from crop output and non-farm activities. The amount of harvests from household farms is probably more observable for people living in the community than other sources of income. Similarly, the involvement of the household head in non-farm activity, if not non-farm income itself, is also easily observable. Income from fishing and natural resources[5] are significant only at 10%. Both income sources that are not significant at all, rent and remittances, are probably the most invisible compared to others.

The highest odds ratio in the estimates is for corrugated iron roof probably the most visible item within the second group which as a group is more visible compared to income; the probability of being classified into a higher wealth group increases 2.5 times as compared to being classified into a lower wealth group if a household has a house with corrugated iron roof. As indicated in the second section, it is difficult to be sure that this is capturing the fact that houses with corrugated iron roofs are economically and 'culturally' most valued or if this is essentially reflecting the high visibility of the resource. Brick wall is also highly significant but contrary to expectations the dummy variable for water pipe is not significant. The probable reason for this is that most of the households with water pipes are concentrated in one district. From the 168 households with water pipe, 101 (64%) are located in one district (Kilosa, Tanzania); in seven of the study districts only fewer than five households have access to water pipe (out of which four has no household have access). Hence, for most of the households in the sample, water pipes are irrelevant and this is probably the main reason why the coefficient is not statistically significant.

Comparison of the estimates for cattle, land, asset value and adults reveal that asset value has the highest z-statistics as well as

[5] Note the odds ratio for income from natural resources is less than one implying the poor may depend on it as source of income rather than the rich.

standardised coefficient.[6] Since asset values are less visible than adults, cattle and land, this probably is a reflection of the higher economic and 'cultural' value of assets. Assets include both farm implements as well as household assets.

On the other hand, a very visible characteristic of the household, number of adults, is given relatively lower weight compared to cattle, land and asset value. This is an indication that labour supply problems are probably not as acute as shortages in land, livestock and assets. This could be either because of labour markets function relatively well or because of high population density.

To have a rough idea of how far the weights estimated from the regression are correlated to the degree of visibility, we ranked the ten resources (excluding the two dummy variables) by visibility and the standardised coefficients and computed Spearman's correlation coefficient. The ranking of resources – which obviously can be controversial - from the most to the least visible is

1. Number of adults: people know more about other people than about resources owned by households
2. Cattle
3. Land
4. Assets
5. Crop and fishing income
6. Non-farm income
7. Income from natural resources and rent
8. Remittances

The Spearman's correlation coefficient equals 0.8476 (p- value = 0.0020). Due to the small number of observation and the difficulty of getting a universally acceptable ranking of visibility, this result obviously should be viewed with care but like the previous results it seems to support the general argument.

The results from the pooled data seem to provide some support to the ideas presented in the conceptual framework. But as indicated in Section 2, the weights attached to resources are expected to differ depending on farming systems and 'cultures' of communities. Since district dummies were included in the previous estimations, it helped to partially control for these effects; in the previous estimation, most of the district dummies were significant. Hence, the next stage is to estimate the regressions on district level to generate district level

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[6] Standardised coefficients are used because the variables in the regression are measured in different units and hence the odds rations cannot be directly compared for variables measured in different units.

weights (the same variables are included). The odds ratio and standardised coefficients are given in Tables 4 and 5.

As expected the results are more nuanced. But still the general pattern that more visible resources are given higher weights holds. For example, from the 52 coefficients related to different forms of income only 12 are significant at least at 10%. In contrast, while 10 out of the 20 coefficients for corrugated iron roof and brick wall are significant, the corresponding figures for cattle, land, asset, and adults are 21 out of 39.

A relatively more visible source of income, non-farm income, is significant in four cases at least at 10%. While the odds ratios are greater than one for Kamuli and Suba, they are less than one for the two Malawi districts implying that non-farm activities are thought to be related to increasing and decreasing wealth in the respective districts. A less visible source of income, rent, is significant in the two Morogoro districts with odds ratios greater and lesser than one.[7] In the case of remittance income the coefficients for Dedza and Suba are significant; since this is probably even a lesser visible source of income, one should expect that in the two districts remittance must be considered as an important means of increasing wealth. From the three, districts with fishing as a major activity, only in Suba is the weight to fish income significant. Probably surprisingly, the coefficient on crop income is significant only in one of the ten districts, Suba; since this is a more visible source of income than others, the result implies in most communities higher crop income is not considered as a distinguishing feature of increasing wealth.

The very visible resources, corrugated roof iron, brick wall and water pipe, are much more significantly correlated with wealth ranks. For example, corrugated iron roof and brick wall are significant in six and four cases respectively with relatively high odds ratios. In the case of water pipe, it is significant only in Kilosa, with a high odds ratios; the probability of moving to higher wealth groups compared to that moving to lower wealth groups is around 4 times for households who have water pipes. As indicated before, Kilosa accounts for 64% of access to water pipes; hence, the district level disaggregated analysis brings out a relationship that was buried in an aggregate analysis.

As indicated above and as predicted from the conceptual framework, much more coefficients for assets and number of adults are significant. In all the ten districts, the highest standard coefficients are for these resources; in nine and six cases the highest two and three standard coefficients are for these resources. If we

[7] Even though the coefficient on rent income in Dedza is also highly significant, the coefficient itself is too low (equals zero at three decimal places).

closely look at the coefficient for individual resources interesting predictions about the community valuation of these resources seem to appear. Despite the fact that the number of adults are highly visible, the coefficient is significant only in four cases. This implies that adults labour is probably not a major constraint; but at least in two districts – Morogoro (Mgeta) and Suba – the odds ratios are high and very significant; this two districts may be characterised by shortage of labour either because of low population or thinness of labour markets.

Cattle, a more visible resource, is not significant in Mbale, Morogoro (Selous) and Zomba. Since visibility is the same across districts, cattle must be particularly valued in Mubende and Bomet; this can be because they play a crucial role in farming systems or are more important as status symbols compared to other districts or because of other reasons.

May be surprisingly, land, a relatively visible resource, is not significant in six out of ten cases. The highest odds ratios are for Mbale and Bomet implying that compared to other districts land probably is a major constraint in the two districts whether because of higher population density or/and less efficient land markets.

Reinforcing one of the results from the aggregate analysis, asset values, which are relatively less visible, are significant in seven cases out of ten and all the odds ratios are greater than one. Hence, the result that household and farm assets are major constraints for increasing wealth generally hold even at a disaggregate level.

So far the implications from the estimated weights are discussed without confronting them with specific information from districts and villages covered by the survey. The next step would be to relate these predictions with specific information on the nature of farming systems and cultures of the communities. But that is beyond the reach of this paper.

Table 4: Odds ratios from ordered logit regressions of wealth ranks by districts

	Uganda			Tanzania			Malawi		Kenya	
Variable	**Mbale**	**Kamuli**	**Mubende**	**Kilosa**	**Morogoro (Mgeta)**	**Morogoro (Selous)**	**Dedza**	**Zomba**	**Suba**	**Bomet**
Income										
Crop	1.177	0.903	1.298	1.324	1.157	1.307	1.175	1.073	1.248	0.960
	(1.07)	(0.83)	(1.52)	(1.20)	(0.47)	(1.01)	(1.40)	(0.41)	(1.67)*	(0.40)
Natural res.	1.001	0.925	0.972	0.917	0.524	0.874	0.872	0.914	0.933	0.992
	(0.01)	(0.74)	(0.24)	(0.83)	(2.85)***	(1.34)	(1.61)	(0.54)	(1.05)	(0.06)
Non-farm	1.039	1.212	0.904	1.077	1.161	1.094	0.839	0.774	1.107	1.067
	(0.46)	(1.84)*	(1.12)	(0.80)	(1.63)	(0.68)	(2.10)**	(2.02)**	(1.77)*	(0.93)
Remittance	0.868	0.808	0.638	0.841	1.106	0.852	1.415	1.137	1.193	0.984
	(1.12)	(1.20)	(1.23)	(1.07)	(0.79)	(0.98)	(2.27)**	(0.38)	(1.93)*	(0.18)
Rent	1.641	0.483		1.160	3.899	0.301	0.000	1.185	0.757	0.889
	(1.48)	(1.18)		(0.37)	(2.48)**	(3.21)***	(36.61)***	(0.41)	(0.67)	(0.56)
Fishing		1.137						0.994	1.125	
		(1.55)						(0.05)	(1.73)*	
Cattle	0.969	2.070	7.296	2.956		0.972	7.594	0.265	1.857	3.081
	(0.07)	(2.15)**	(3.16)***	(3.86)***		(0.12)	(2.32)**	(0.99)	(3.11)***	(3.79)***
Land owned	4.784	3.404	1.776	1.337	1.432	2.362	1.588	2.290	1.267	3.694
	(2.70)***	(1.79)*	(1.20)	(0.59)	(0.51)	(2.55)**	(1.02)	(0.96)	(0.67)	(3.28)***
Asset value	1.744	1.448	1.929	1.147	0.783	1.579	5.227	3.500	1.263	2.761
	(1.72)*	(2.22)**	(2.53)**	(1.28)	(1.18)	(1.94)*	(7.15)***	(3.06)***	(1.13)	(3.91)***
Adults 15-65	2.144	2.193	6.918	3.001	18.755	3.946	1.220	2.588	4.670	0.662
	(1.13)	(1.63)	(2.37)**	(1.87)*	(3.33)***	(1.29)	(0.49)	(1.39)	(3.44)***	(0.89)
Cor. roof	3.336	1.747	1.125	2.168	4.550	3.069	4.960	4.643	1.928	4.271
	(2.34)**	(0.94)	(0.20)	(1.85)*	(2.81)***	(1.21)	(2.27)**	(1.59)	(1.76)*	(3.95)***
Brick wall	4.991e+13	0.823	1.344	1.174	3.356	4.556	0.425	0.851	3.029	3.075
	(31.17)***	(0.27)	(0.45)	(0.30)	(2.39)**	(1.77)*	(1.70)*	(0.24)	(1.60)	(1.00)
Water pipe		0.449		3.802	0.472	0.428				
		(0.83)		(1.81)*	(1.32)	(1.36)				
Observations	105	105	105	140	105	105	210	70	175	175
Chi-square	1503.09	43.88	25.85	59.87	39.71	42.49	1533.31	31.30	55.14	102.28
Pseudo r2	0.30	0.22	0.35	0.20	0.22	0.31	0.29	0.23	0.26	0.39

Note: All continuous variables in natural logarithms; 'Employee' stands for household heads working in parastatal or government organisations, in private sector and non-farm self-employment; Robust z statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Standardised coefficients from ordered logit regressions of wealth ranks by districts

	Uganda			Tanzania			Malawi		Kenya	
Variable	**Mbale**	**Kamuli**	**Mubende**	**Kilosa**	**Morogoro (Mgeta)**	**Morogoro (Selous)**	**Dedza**	**Zomba**	**Suba**	**Bomet**
Income										
Crop	1.3294	0.7960	1.4928	1.3880	1.1579	1.4614	1.2395	1.1267	1.4004*	0.9297
Nat res.	1.0016	0.8226	0.9459	0.8503	0.4533***	0.7580	0.7900	0.8730	0.8341	0.9884
Non-farm	1.1199	1.6860	0.7642	1.1935	1.4251	1.2099	0.7024**	0.5242**	1.4019*	1.2050
Remittance	0.8134	0.7887	0.6351	0.7991	1.2032	0.8122	1.4149**	1.1607	1.3018*	0.9650
Rent	1.2604	0.6873		1.0694	1.7389**	0.3908***	0.0021***	1.0612	0.8226	0.9378
Fishing		1.5152						0.9839	1.4183*	
Cattle	0.9813	1.8782**	5.1841***	2.2653***		0.9655	2.2849**	0.6881	1.8928***	2.4229***
Land	2.5714***	1.8688*	1.4131	1.2025	1.1534	1.8193**	1.1764	1.3993	1.1375	1.8688***
Assets	1.7975*	1.8292**	2.2414**	1.3091	0.7241	1.8674*	5.1010***	3.7508***	1.2581	3.3695***
Adults	1.4276	1.3244	1.9839**	1.5063*	2.7591***	1.5830	1.0862	1.5664	1.9620***	0.8484

Note: All continuous variables in natural logarithms; 'Employee' stands for household heads working in parastatal or government organisations, in private sector and non-farm self-employment; Robust z statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

5. Conclusion

This paper starts from a simple conceptual framework for a more systematic analysis of information from community wealth ranking used with data from household surveys. It is argued that the relative visibility of resources can help us understand the weights given to different types of resources in wealth ranking exercises. This analytical framework was examined by using data collected from rural areas of four eastern Africa countries.

Most of the empirical estimation support the idea presented in the conceptual framework. But an analysis of more specific information on farming systems and cultures of the communities is required to see if the predictions from the analytical framework really hold.

A systematic analytical framework for analysing and interpreting information from wealth ranking exercises will contribute to a better understanding of the economic and 'cultural' values people attach to different resources. In addition to providing a better framework for analysing a lot of data already collected, it would also be a contribution to combining qualitative and quantitative methods of analysis. More ambitiously, it can lead to a more coherent theory on the formation of community level preferences that can help us understand how people value different types of resources.

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