Part I
Notes on Expenditure Elasticities in Africa

1 Demand Analysis - Summary

The marketing and supply concerns have been ignored for the current stage of the study. The study of demand encompasses the household surveys in Tanzania and UK - inspecting the income elasticities of chosen commodities. The analysis focuses on Engel curves for the commodities and temporarily avoids the time-series analysis of incomes and prices.

2 Cross Section Analysis

If a population is observed for a sufficiently long time, then we can understand the effects of changing incomes, price variations on their choices. A significant degree of demand analysis from panel data comes out of the Slutsky equation approach (e.g. the well-known AIDS model - a particular version of the Rotterdam model). With no time-series data, on the other hand, one relies on price-variations within the cross-section and interpretations of commodity-elasticities (instead of effects of changing income on a monitored household).

By adding more parameters to the semi-logarithmic model, one runs the risk of overfitting. It is easy, in other words, to stress on transient parameters in a given cross-sectional snapshot. The calibration of a cost-function and imposition of general conditions on the demand equations can get around some of these problems.

3 A brief survey of household consumption models

3.1 Analysis by Prais-Houthakker

Houthakker attributes the popularity of Engel curves to the idea of equivalence scales (i.e. how different households achieve same level of living standard). Although Houthakker's Engel fitting would now be considered unashamedly pragmatic [6], his research was influential in popularising the use of income and expenditure elasticities in cross-sectional analyses [22].

The simplest Engel curves are set up with the Woking-Leser model hitherto used in the study:

$$w_i = \beta \cdot log\ x_i + \alpha \tag{1}$$

Here, budget share total expenditure $x = \sum p_i q_i$, budget share$w_i = p_i q_i / x$ while α, β are regression coefficients.

A noticeable shortcoming with the Woking-Leser model is that no commodity specific information is used in the semi-logarithmic equation. The current study attempts to enhance this model with household and geographic parameters.

3.2 Cost Function and the Gorman Model

The Gorman approach considers a more general Engel curve: $w_i = \sum_{r \epsilon R} a_{ir}(p) \Phi_r(ln(x))$ (R is a finite set and $\Phi_r(\cdot)$ are general functions). For these to be consistent, one arrives at the cost function: $\frac{\partial\ ln\ c(u,p)}{\partial\ ln\ p_i} = \sum_{r \epsilon R} a_{ir}(p) \Phi_r\{ln\ c(u,p)\}$ (where u =utility, p =price). Gorman derives following restrictions on $\Phi_n(\cdot)$:

$$w_i = a_i(p) + b_i(p) ln\ x + d_i(p) \sum_{m=1}^{M} \gamma_m(p) (ln\ x)^m \tag{2}$$

$$w_i = a_i(p) + b_i(p) \sum_{\sigma_m \epsilon S_-} \mu_m(p) x^{\sigma_m} + d_i(p) \sum_{\sigma_m \epsilon S_+}^{M} \theta_m(p) x^{\sigma_m} \tag{3}$$

Here, S is a finite set of elements σ_i, S_- its negative elements and S_+positive ($m = 1$ leads us back to Working-Leser form). $\sum a_i(p) = 1$ and $\sum b_i(p) = 0$. Gorman model combines "demographic scaling" and "demographic translating"[21].

A significant amount of research has been done in scaling of the individual model (through the analysis of the so-called cost-of-children problem). Muellbauer has enhanced the model by considering every household a multiple of unit a^h (individual). One considers a multiplicative index $m(a^h, u^h)$such that:

$$c^h(u^h, p, a^h) = m(a^h, u^h) \cdot c(u^h, p) \tag{4}$$

Here, $c(u^h, p)$ is the cost-function for every household. The budget share $w_i^h$is independent of a^h:

$$w_i^h = \frac{ln\ c(u^h, p)}{\partial\ ln\ p_i} \tag{5}$$

With derivatives with respect to a^h, Muellbauer further uses the above equation (and PIGLOG functions) to study the Barten's model for cost-of-having-children [19].

3.3 Testing Spatial Variation

An analysis of expensive vs non-expensive food items was done by Prais and Houthakker (1955)[22]. This has been employed for LSMS data in the current study. To address spatial variations, Deaton use the following model for a cluster-based analysis:

$$ln\ q_{Gic} = \alpha_G^0 + \beta_G^0 ln\ x_{ic} + \gamma_G^0 \cdot z_{ic} + \sum_{H=1}^{5} \theta_{GH} ln\ p_{Hc} + (f_{Gc} + u_{Gic}^0) \tag{6}$$

$$ln\ v_{Gic} = \alpha_G^1 + \beta_G^1\ ln\ x_{ic} + \gamma_G^1 \cdot z_{ic} + \sum_{H=1}^{5} \psi_{GH} ln\ p_{Hc} + u_{Gic}^1 \tag{7}$$

Here, quantity of good G consumed by cluster c is q_{Gic}, the associated unit-value is v_{Gic}, total expenditure is x_{Gic}, a vector of household demographic characteristics is z_{Gic}. Two error terms used consist of i) a cluster-specific random effect f_{Gc}along with the error $u_{Gic}^0$and ii) idiosyncratic erroru_{Gic}^1. The computation of variance-covariance vectors$u^0$and$u^1$is used to derive cluster effects e.g. inter-cluster variances and covariances for the separable goods.

4 Current Analysis

4.1 Current Model

The form [6]currently used in the study is:

$$ln\ q_i^h = \alpha_i + \beta\ ln\ x^h + \gamma_i\ ln\ n^h + u_i \tag{8}$$

Attempts to improve the regression were made by considering asset-ownership and number of young members in addition to total size of the household n^h(note that the prices are assumed constant during the snapshot of the recorded week). The clustering effect was not found significant for cheaper commodities. Also, as expected, the size of the household (i.e. number of family members) is a more significant indicator of consumption of commodities like sugar than for fruits or meat.

Further enhancements, with a Gorman form and weak separable tests are yet to follow.

4.2 Measuring Price

From LSMS data, prices are calculated by dividing expense by the quantity (this is the method used by Prais and Houthakker - which ignores price-indices) [22].

It is found inferred prices do vary quite a bit amongst different commodities. However, this variation is significantly lower for subsistence sugar (or beans) - the price for which don't vary as much as they do for meat. In a fashion similar to Prais - Houthakker [22](who visit the price variation of Tea to find that for a given income households of smaller size buy more expensive varieties of tea in the UK), the quality and quantity elasticities were derived based on classification of commodities according to price (inferred).

4.3 Income Elasticities of commodities

Prais-Houthakker model the combination of quantity vs quality as : $dq_i = p_i \delta p_i + k_i \delta k_i$ (change in quality - indicated by price and change in quantity indicated by quantity). This leads to :

$$\frac{x}{q_i}\frac{\partial q_i}{\partial x} = \frac{x}{k_i}\frac{\partial k_i}{\partial x} + \frac{x}{p_i}\frac{\partial p_i}{\partial x} \tag{9}$$

Prais-Houthakker derive quantity elasticity as difference between expenditure elasticity and the quality elasticity. The quality-adjustment to the quantity can provide more insight in the factors affecting expensive consumption ([4],[7]). Analyzing the tea-consumption in the UK, for example, Prais-Houthakker find small-size families spending proportionately higher on expensive tea varieties. The quality elasticities obtained in a similar fashion for alcohol, fruits and meat in Tanzania, show significant differences in quality elasticities across income groups.

5 Future Work

The current study notes elasticity differences between expensive and less-expensive varieties - leaving us with quality-elasticities. However, at this point, a correlation of these elasticities with perceived conspicuous consumption, although methodical, is a rather subjective exercise. This is intended to be improved with a more robust utility-theory based approach (research by Ireland[14]).

Towards that goal, I intend to develop methods to test separability in the context of conspicuous consumption - instead of assuming weak-separability of different commodity groups. The index prices obtained for these commodity groups are planned to be used for better estimates on expenditure elasticities.

6 Poor Economics - a discussion of development economics issues [2]

There is evidence for "flight to quality" amongst poor[16]. Deaton notes a characteristic drop in consumption of food in developing countries (relative to other commodities)[8]. There are local factors that tend to stand out in developing countries - e.g. funeral expenditures in Swaziland. There is ample evidence to show that other commodities compete with welfare-related commodities (e.g. healthy food or financial investments). Banerjee et al. do not attribute this to temptation - but to lack of health insurance and sufficient cash (letting medicines and maintenance of work become more important than children's education or healthy food).

It is also worth noting that often times consumption on products/services that provide welfare could be less just because the quality of these services is extremely low in developing countries (e.g. education provided by the public sector).

In observed social changes, clustering based on religion or social groups is found significant in consumer behaviour (e.g. In India, muslims are influenced more by other muslims and hindus in the same locality [p118]).

The theory of impatience, despite its appeal, makes less sense for the poor and is considered irrelevant for the current study - since the evidence shows that poor tend to make choices as rational as their richer counterparts. Moderate success of microfinance (despite concerns with credit monitoring and administration)

offers one such instance. Against the intuition, the poor seem to have sufficient hunger for saving methods and go the extra mile to save for future (even though saving is far more stressful for them).

However, one cannot get carried away with the opportunities that poverty can create. Banjerjee et al. also note that it is the lack of regular employment that makes the poor more likely entrepreneurs (even though their success rate is much lower) - not the psychological "drive" as many would perceive.

Part II
A summary of studies on conspicuous consumption

7 Visibility, Status and Congestion

The term "conspicuous consumption" traces its roots back to the treatise "Theory of the Leisure Class" authored by Thorstein Veblen in 1899. At about the same time when Marx endorsed the view of all commodities as products of labour (diamond and corn alike), Veblen sought to explore the psychological basis for consumption among the economic classes. His view of conspicuous consumption may at times appear critical of the "bourgeois" wastefulness [1] - but Veblen doesn't dwell upon the equivalence of labour for exchange of commodities. While he observes the tendency amongst the elite to distance themselves from physical labour - he argues that this tendency has transformed itself into a desire of displaying exploits and has survived in culture from more primitive hunter-gatherer and agrarian societies. This symbolism is inherent in all exchange of goods and services (including devotion and education [2]).

Even when the ideas of conspicous consumption have been revived in works of Ireland[14] or Arrow, Dasgputa [1], the literature has relied on what is considered wasteful - thus modeling conspicuous consumption as the difference between social welfare and market equilibrium. Of particular interest is a model of status-signalling provided by Ireland[14] where consumers attempt to maximise a combined utility of visible (public) and non-visible (private) consumption[3]. The model is of remarkable simplicity but calibrating it involves a sensitivity-parameter of how much visible consumption matters to the consumers. Given the nature of status competitions in society, such a calibration is hardly trivial. A study by Heffetz[12] using this model involved surveying a few hundreds of respondents asking them - quite literally - just how visible every item is for a typical consumer [14].

A survey quantifies a lot of complex interations in what constitutes status competitions in a society. A luxury item - for example - needs to be marketed as a luxury for it to both impart visible signals to others and to improve self-perception of the buyer. In Veblen's original framework, for a product to indicate status it must be rare and superfluous (thus serve as an exploit). That a watch is more noticeable than an insurance policy (and associated with higher income) is not entirely relevant to this framework. Moreover, whether a poor person buying a cheap watch and a richer person buying a watch that is far more expensive (and probably subject to import restrictions) are both instances of conspicuous consumption or not depends on the context that the observer chooses. Cheap watches may or may not constitute conspicuous consumption - depending on the social welfare function. The wide variety of criteria in conscpicous consumption seem to indicate this ambiguity (See Table 2).

The choice of visible and non-visible goods matters more in developing markets where a culture of mass consumerism is only nascent and status competitions aren't driven by economic inequalities alone (whereas in developed markets, firms are quick to turn a conspicuous item into a higher-priced commodity). The context

[1] "Throughout the entire evolution of conspicuous expenditure, whether of goods or of services or human life, runs the obvious implication that in order to effectually mend the consumer's good fame it must be an expenditure of superfluities. In order to be reputable it must be wasteful."[23]

[2] "The adoption of the cap and gown is one of the striking atavistic features of modern college life, and at the same time it marks the fact that these colleges have definitely become leisure-class establishments, either in actual achievement or in aspiration".[23]

[3] The utility function is modeled as $U = (1-a)f(v,w) + af(\hat{v},\hat{w})$. Here $\hat{v},\hat{w}$ are societies' view of the consumption and $a(>0)$ is a parameter indicating how much visible consumption matters to the consumer.

of exploits identified by Veblen is however still relevant in the developing markets[4]. In its original sense, conspiciuous consumption is an ecological concern and plays within the realms of sociology[5]. The research on conspicuous consumption in the developing world has often found that the consumption of visible items (for a certain selected criterion) differs significantly between social classes [6].

In both the developed and developing worlds, conspicuous consmption is driven by scarcity and competition ([13, 9]). If status were imparted by inherited wealth alone, there would be little conspicuous consumption as the consumers would be quick to realise the futility of buying trinkets. In the developed world, where markets have evolved to address the demands of the population, the positional pressures are readily addressed by market forces - thus a preference for visible goods indicates a higher price on them and a higher consumption on visible products always "signals" a higher status (a product with a higher status symbol would automatically carry a higher price). In underdeveloped markets, where information asymmetries are abound, the higher signalling (visible component of combined utility) would not necessarily be achieved with higher spending on visible goods - and other factors start to matter in the combined utility function - as is suggested by data from various cross-section expenditure surveys.

8 Visible consumption in the developing world

A rural setting in a developing country more often evokes images of immiserization than competitions for positional consumption. Still, the visual splurge offered by the new economic developments offers new venues of visible consumption in the urban developing world. Here, the basket of visible and industrial consumption has expanded, a new spirit of individual consumerism has replaced the rural contractual arrangements left untouched by successive nationalist governments. Looking at Tanzania, the spending on marriage and funerals seems high, but it now competes with higher spending on consumer electronics and electricity. The current study views the cross-sectional expenditure data from Tanzania from a perspective of visible consumption.

The presence of conspicuous consumption in developing countries has been a recent topic of interest ([18],[15]). Table 2 summarizes the data and methodologies for some of the studies. The studies have been based on a visible basket classified first by Heffetz - where the consumer basket constituents were sorted by a visibility measure based on a survey of 480 respondents. Conducted in US, the respondents were asked how long it took them to notice the consumption for commodities in the US CEX categories (listed in Table 1)[7]. The visibility index computed from survey responses was found to have a significant predictive power for total expenditure elasticity.[8] . Robustness tests (regressions for different quantiles and across multiple demographic categories) reported an all through significance of the Vindex regressor.

A similar survey of visibility of commodities was not repeated by many other studies conducted on the

[4]"No class of society, not even the most abjectly poor, forgoes all customary conspicuous consumption[23].

[5]"Increased mobility of the members has also added to the facility with which a "social confirmation" can be attained within the class."[23]

[6]Kaus finds that black ethnic groups spend more on visible commodities than the white ethnic population in South Africa - arguing that status is gained through means other than consumption[17]. Khamis et al find that the Muslims spend less on visible consumption items when compared to Hindus of same economic standing[18].

[7]The exact question was - "Imagine that you meet a new person who lives in a household similar to yours. Imagine that their household is not different from other similar households, except that they like to, and do, spend more than average on [jewelryand watches]. Would you notice this about them, and if so, for how long would you have to have known them, to notice it? Would you notice it almost immediately upon meeting them for the first time, a short while after, a while after, only a long while after, or never?" [12]. Responses were coded from 1 (almost immediately) to 5 (never). The question was repeated for each expenditure category (randomly ordered). A normalized measure was then used as the visibility index.

[8]The utility function is modeled as a combination of a private consumption function and an observable consumption function. Considering the Cobb-Douglas utility function $f(v,w) = \beta_v \cdot f(v,w) + \beta_w ln(w)$ over constraint $y = v + w$ where y is the budget constraint and (v,w) are visible and non-visible good quantities respectively. Instead of the standard Engle curve model : $v = \frac{\beta}{1+\beta} y$ and $w = \frac{1}{1+\beta} y$ (where $\beta = \frac{\beta_v}{\beta_w}$), the authors use the model provided by Ireland et al ([14]). Using an individual's sensitivity to social status signals in the model, they use a utility function $U = (1-a) f(v,w) + a f(\hat{v},\hat{w})$ (where $\hat{v},\hat{w}$ are societies' view of the consumption and $a > 0$). Solving for a separating equilibrium, this results in $y = \frac{1+\beta}{a+\beta} + Cv^{-\frac{\beta}{a}} (a > 0)$ where $C = \frac{a}{a+\beta} (\frac{\beta}{1+\beta})^{\frac{\beta}{a}} b^{\frac{a+\beta}{a}}$ (C is derived by considering the utility maximization at lowest income level b as the boundary condition for the utility maximization problem). Elasticities in this model are $e_v = \frac{dv}{dy} \cdot \frac{y}{v} = a((1+\beta)\frac{v}{y} - \beta)^{-1}$.

Tobacco products like cigarettes, cigars, and pipe tobacco
The purchase of new and used motor vehicles such as cars, trucks and vans
Clothing and shoes, not including underwear, undergarments and nightwear
Home furnishings and household items, like furniture, appliances, tools and linen
Jewelry and watches
Computers, games, TVs, video, audio, musical and sports equipments, tapes, CDs
Dining out at restaurants, drive-throughs, etc, excluding alcohol including food at school
Alcoholic beverages for home use
Barbershops, beauty parlors, hair dressers, health clubs, etc.
Alcoholic beverages at restaurants, bars, cafeterias, cafes, etc.
Cable TV, pets and veterinarians, sports, country clubs, movies and concerts
Books, including school books, newspapers and magazines, toys, games and hobbies
Education, from nursery to college, like tuition and other school expenses
Food and nonalcoholic beverages at grocery, specialty, and convenience stores
Rent, or mortgage, or purchase, of their housing
Mobile phone services
Airline fares for out-of-town trips
Lodging away from home on trips and housing for someone away at school
Public transportation, both local and long distance, like buses and trains
Vehicle maintenance, mechanical and electrical repair and replacement
Gasoline and diesel fuel for motor vehicles
Medical care, including health insurance, drugs, dentists, doctors, hospitals etc.
Contributions to churches or other religious organizations and other charities
Laundry and dry cleaning
Home utilities such as electricity, gas, and water; garbage collection
Home telephone services, not including mobile phones
Legal fees, accounting fees, and occupational expenses
Vehicle insurance, like insurance for cars, trucks, and vans
Homeowner's insurance, fire insurance, and property insuranceools and licenses
Life insurance, endowment, annuities, and other death benefits; insurance
Underwear, undergarments, nightwear, and sleeping garments

Table 1: Consumption Categories in CEX ordered by visibility rankings

Authors	Estimation Procedure	Data Sources	Basket constitutents
Kaus[17]	Cross-sectional 2SLS with demographic and time variables	IES(expenditure survey) - visible categories through vindex	Baskets from Charles et al - selecting personal care, cars, jewelry and apparel (including footwear) products
Charles et al[3]	Cross-sectional 2SLS with demographic and time variables	CEX(expenditure survey) - visible categories same through vindex. Despite its visibility, housing has been excluded from the list.	Clothing/Jewelry/Shoes (029) Clothing Services (030) Jewelry and Watches (031) Personal Care (032) Barbershops, Beauty Parlors, and Health Clubs (033) Motor Vehicles (052) Repair, Leasing, Greasing, Washing, Parking, Storage, and Rental Services(054) Reduction of Principal on Vehicle Loan (096) Tires, Tubes, Accessories, and Other Parts (053)
Friehe, Mechtel[10]	Regression with demograpic and time controls	EVS (expenditure survey) - visible categories through vindex. Items that are subsidized e.g. housing, pharmaceuticals or those with no significant visibility are ignored.	Basket from Charles et al, Heffetz (Table 1)
Khamis, Prakash, Siddique[18]	Cross-sectional 2SLS with demographic and time variables	2005 Indian Human Development Survey (IHDS) The commodities were sorted based on a visibility survey conducted in an Indian university.	Personal Transport Footwear Vacations Furniture Social Functions Repairs Clothing Jewelry Recreation Goods
Omori, Smith[20]	Regression with demograpic and time controls	US CEX (expenditure survey)	Clothing (including shoes) from the US CEX categories (Table 1)
Heffetz[12]	Visibility Elasticities estimated through weighted/kernel regression with a Visibility Index (Vindex)	Vindex (surveyed), US CEX (expenditure survey)	Survery of visibility of commodities (See Table 1)
Jaikumar, Sarin[15]	2SLS with Gini-Index as control variable and household assets as instrument for permanent income control (total expenditure)[9]	2005 Indian Human Development Survey (IHDS)[10]	Basket identified by Khamis et al

Table 2: Critieria of Conspicuous Consumption in surveyed literature

developed world works[12] . Many studies have relied on the basket defined by Charles et al[11][3]. The definition of visible consumption is often adjusted in these studies depending on the socio-cultural context (See Table 2). Omori-Smith ignore all visible consumption categories from the Charles et al study except that of clothing (including shoes)[20]. Friehe-Mechtel used several definitions of the visibility basket to study the robustness of their results[10]. A study of the consumption in South Africa by Kaus chose a basket of products as close as possible to that in the Charles et al study[17].

The need for a survey to measure visibility of items in the basket is however necessary when conducting similar studies in developing world countries[12]. Visibility is a socio-cultural judgment - and the visibility basket from the developed world cannot be translated as such into disparate geographies and cultural environments of the developing world. One can arrive at wrong conclusions on visibile consumption for a consumer group if a visiblity basket was chosen from a different cultural environment. For example, hair-products may be associated with a higher visibility (and promise) in the developed world but in the developing world their purpose could be just utilitarian (poor quality of production, cultural factors etc.). Attributing lower visible consumption based on a low consumption of hair-products would thus be erroneous.

Another practical problem arises in the developing world because of the predominant use of recall method in expenditure survey. A relevant anomaly is the Deaton Paxson paradox([5]) - i.e. the observed decrease in food expenditure per head as household size rises (with constant outlay per head). The likely cause for the paradox is presence of errors correlated with household size in the data that results in possible overestimation of the consumption of recalled items[11]. Caution must therefore be taken (or a correction applied) when mixing expenditures from recall and diary methods.

While the visibility elasticities may not be compared across countries without above considerations but a comparison within the country can provide insights into the effect of certain demographic factors on visible consumption. This has been the central theme for most of the studies surveyed in this note. More than to improve the mesurement of visibility, the studies are interested in identifying the demographic parameters that explain the log-expenditure of visibilty basket as is. The general regression equation for such a study is the following:

$$ln(vis_i) = \beta_0 + \beta_1 \cdot Dem_i + \beta_2 \cdot ln(pInc_i) + \epsilon \tag{10}$$

Here vis_i is the total visible consumption of the household i (accumulated over the chosen visibility basket), Dem_i is a vector of demographic indicators under consideration and $pInc_i$ is the permanent income - proxied by total expenditure. Households with higher total expenditure are far more likely to be those with higher visible expenditure. Thus, total expenditure (on the right side of the equation 10) makes it an endogenous variable for the dependent varaible : $ln(vis_i)$. A different approach is taken by Jaikumar et al who use weights in the basket rather than visible expenditure levels - so that visible expenditure is not subject to the endogeneity problem that arises due to total expenditure being on the right hand side and visible expenditure on left hand side of the equation[15] (The proportion of visible expenditure with respect to the total expenditure could be the same for those with higher total expenditure and lower total expenditure). However, since data on income is often poor or sparse in the developing countries, total expenditure turns out to be the most frequent choice for a proxy of permanent income ($pInc_i$ is a key control parameter for the analysis of visible consumption). In most of the studies, the said endogeneity of total expenditure is resolved by a choice of appropriate instruments - e.g. income, cubic-income, postive-income dummies or occupation codes. These instruments identified by Charles et al.[3] are reported to be quite strong in the studies surveyed as part of this note (Sargan and Wu-Hausman tests confirm endogeneity and the effectiveness of chosen instruments).

[11]Charles et al themselves ignore housing expenses - despite its clear visibility- because of the known housing differences in the US between black and white social groups[3].

[12]Khamis et al[18] ask two key questions to respondents in an online survey conducted in India. First asked them how closely they needed to interact with their neighbour (with similar demographic characteristics) in order to observe above average spending for a list of items (Options were -'1: No Interaction', '2: Occasional Interaction', '3: Friend', '4: Close Friend' or '5: No matter how much one Interacts'). An item where >20% respondents report 1 or 2 was considered a visible item. A second question asked them what they'll expect of the consumption of an item after a sudden 20 percent rise in their neighbor's income '1: Fall', '2: Stay the same', '3: Increase by less than 20 percent', '4: Increase by 20 percent' or '5: Increase by more than 20 percent'. The list of items in these questions attempted to match the consumption categories in the IHDS. An item is associated with higher income if more than 20% of respondents reported 2,3,4 or 5.

Visible Commodity Code	Description
202	Electricity
213	Skin Creams
214	Other personal products (shampoo, razor, cosmetics etc.)
224	Repairs to household and personal items
301	Carpets, rugs
306	Sports & hobby equipment, musical instruments, toys
313	Marriage Ceremony
314	Funeral

Table 3: Visible commodities in LSMS data

Mean Household size	5.27
Mean age of household head	46.36
Average number of rooms per household	3.33
Percentage with houshold head educated secondary or higher	16.14
Mean Total Expenditure (Tanzanian Shillings)	2471122
Percentage Employed in Agriculture	47.76
Total Number of Households	2979

Table 4: Descriptive statistics for LSMS Tanzania 2010

9 LSMS 2010 data on Tanzania

Tanzania has been the first country to be surveyed as part of this study. With recent economic growth and a history of nationalization, the country provides a much desired snapshot of the consumer world of developing sub-Saharan Africa. The data chosen for the preliminary analysis is from the Living Standard Measurement Study (LSMS) conducted by the World Bank. LSMS includes expenditure microdata from about 10,000 households - with many of the expenditure categories of potential visible value. With no verifiable measure of visibility, all expenditure not related to food and utilities is evaluated for potentially visiblity. These chosen cateogries from LSMS are listed in Table 3 - these are meant to include the categories identified by Khamis et al as far as possible[18].

9.1 Descriptive Statistics

The preparation of the data involved normalizing the data for total expenditures by combining expenditure on items collected through recall and diary methods. The summary statistics are shown in Table 4.

Obtaining visible consumption elasticities (using equation 10) from recall method while computing total expenditure (food etc.) based on diary method can result in measurement errors discussed in the previous section (it is argued that larger families are more likely to underestimate their purchases when recalling). When the weekly data is mixed with yearly data - the extrapolation of past week's consumption may possibly overestimate food costs[13].

The income spectrum is heavily skewed in the developing world. In Tanzania, only around 30% of heads of the recorded households have any reported income. Having two jobs and owning multiple self-owned (small) businesses is not uncommon and the mode of payment is often not in cash. The amount of income recorded for the household is thus frequently based on the person's estimate of the item provided as income. All of these can make the incomes estimates noisy at best. The income levels themselves seem poorly correlated with expenditure levels. One possible way to measure this noise is by observing the variance of income in the same region[14]. Given the sparsity of available income data, however, instruments for age and occupation

[13] To test the significant of this issue, one can test whether the surveyed households are equally likely to overspend in the recorded week

[14] If there are X individuals with $n_i (i \epsilon X)$ sources of income each, then it is safe to assume that workers in the same region and same employment-type have resonably similar incomes. The variance in incomes recorded for the same local group can give an estimate of how noisy the data is due to self-reporting.

codes were chosen for the current study.

10 Detecting and measuring positional consumption

10.1 Measures for Scarcity [13]

Heffetz finds that the degree to which people notice items explains the corresponding (permanent) income elasticities better. This observation has provided the basis for inspection of visible consumption in many studies thereforth. In an environment of inequalities, however, it is likely that the indvidiuals with perceived higher status notice items differently from how the lower status individuals might notice them. The social factors thus relevant for the difference in visible preferences are sought in the studies on visible consumption in the developing countries. In India, this is found to be religion and caste - while in South Africa and United States, race seems to have a dominant significance. It is also worth noting that the developing countries may offer a less consumerist agrarian environment overall where expenditure is more visible than in a relatively individualistic and industrialized society.

For visibility to bear significance in an environment of severe inequalities and scarcities, an association with higher income becomes relevant. Khamis et al [18] perform a slightly more detailed survey by asking what an individual whose consumption is noticed would do when her income rises (by 20%). This quantifies the expectations from others associates the total expenditure with higher-income. The items where consumers expect the consumption to rise with increased income are those that associate with higher income and are declared "conspicuous" in the study.

In a developing economy, the criterion for conspicuous consumption is clearly not just noticeability any more. Visible consumption may detail the mechanics of status competitions in a narrow sense where consumers participate in a market to increase their perceived status - but it does not provide an adequate picture of conspicuous consumption. One reason is that markets are underdeveloped in the developing world and social status is largely yielded through economic classes and social conditions. The second - probably more significant - reason is that status signaling does not exist in a society as an inherent need for visible appeal amongst humans. Instead visible consumption matters because of an item being associated with a higher status (at least in the sense which Veblen had talked about in his 19th century treatise[23]).

A study of status and scarcity of items therefore goes hand in hand with the study of conspicuous consumption. Instead of limiting ourselves to visible consumption as the particular mechanics of status signaling - where consumers buy items in a common market and (presumably) over-weigh on items that are more noticeable - we attempt to understand the reasons behind status-signaling by looking at the differences in patterns between the richer and poorer sections of society and attempt to understand how unavailability of items (scarcity) as well as disparities of services across regions and classes in a society are reflected in both price and consumption of commodities.

This is not to discount a study of visible consumption or the importance of a visiblity survey in any way. In fact, visible consumption is ever more relevant with recent trends in advertisement and consumerism in the developing world. Even though scarcity is fundamentally more important than noticeability, we argue that scarcity merely allows status competitions to develop. The factors that affect status competitions are indeed beyond scarcity.

With that admission, we decide on the three degrees of scarcity that we can associate to an item - and define a fundamental assumption to justify the existence of status competitions arising out of the scarcity of a commodity. We assume that the richer half of the society invariably indicates higher status (than lower) and has access to more facilities (than less). In other words, when individuals are ranked by permanent income, scarcity is always faced by the lower half of the society. With this assumption, status competitions would occur when people with lower income would want to achieve higher status. The conspicuous items in this view are objects that indicate achieving what's scarce.

The method with percentile thresholds briefly described in the section 10.3 measures scarcity on grounds of i) availability (electricity, food, education etc.) and ii) affordability. If the item is affordable and not available, it would be classified as scarce. Severe(1) scarcities - which would be a physical scarcities in a Hirschian sense - would create minimal status competitions while under medium scarcity(2), status competition would thrive. For items that are not scarce(3) at all (i.e. affordable by all and available to all) would not allow status competitions to develop.

10.2 Methods to measure Visibility

The direct way of measuring visibility is to find an evidence of visibility in the comomdities. Most studies have relied on their own visibility surveys. In absence of such a survey, one can verify commodities from public media - e.g. advertisements or social media traffic. These methods have not been pursued at this stage in the study.

10.3 Consumption percentiles

The differences between amounts spent by the lowest and higher percentile of spenders of a particular commodity are expected to be higher when a commodity is a status-good than when it is of common utility. The illustrations show non-zero log-level expenditure on a few commodities when the lower (let's say θ) percentile of the consumption of the commodity is ignored. Ignoring the bottom θ percentile of the consumption of a visible commodity is equivalent to treating the bottom θ percentile expenditure as non-visible consumption (If we consider $\theta = 10\%$ for electricity, then bottom 10% percentile of the consumption on electricity would be consider non-visible and anything above that level would be considered visible). The plots of log-expenditures are shown with rising θ (starting with the lowest percentile θ that corresponds to lowest non-zero log-level of consumption of the commodity).

For a good that is not positional, one expects that the consumers from lower and higher quantiles of total expenditure (x-axis) would consume similar amounts of the good (y-axis). For a positional good, the consumers spending higher expenditure on the good would lean towards consumers with higher total expenditure. This does not indicate signaling in any way - but tests only whether a commodity is consumed uniformly amongst those with lower and higher total expenditure outlays (this is rather a measure of sarcity of the item than of its visibility). Choosing different thresholds (θ) provides a a control on the degree to which a certain commodity can be included in our conspicuous consumption basket. Instead of asking whether marriage spending is visible or not - for example - the test asks if only the richer consumers can afford a significant expenditure on marriage (while varying the degree of visibility attached to spending on marriage).

In the data from Tanzania, while top 56% of consumers show spending on rice, electricity appears to be a luxury when only top 22 % of consumers spend on it. This does not necessitate that a higher consumption of electricity indicates higher status but a higher threshold for electricity certainly indicates its physical scarcity which may permit status competitions.

Not all scarce objects can be indicative of status - we often need some judgment to decide which products may indicate status signaling. A survey accomplishes this by ranking all products as viewed by its respondents. It must also be noted that visibility or positional signaling of a commodity is hardly orthogonal to major expenditure categories. The usual arguments of additive utilities cannot hold for conspicuous consumption. In other words, if walnut turns out to be of visible significance (ranked high in the consumers' perception of visibility in the survey) then one can no longer talk about the combined utility of food and visible items (walnut is both a food item and a visible good). Detailed microdata thus becomes a necessity for discussing income elasticities of visible items ([1, 12]).

A similar analysis of Consumer Expenditury Survey (CEX) data from years 2004,2010 and 2014 similarly shows clear differences between expenditure on jewelry and fruits. It is evident that jewelry is not popular amidst the relatively poor and that richer consumers spend a higher portion of their total expenditure on jewelry than on fruits (curve being steeper for jewelry).

11 Analysis of LSMS Data

11.1 Steps in preparing LSMS data (2010)

Following steps were performed before running the regressions on the household consumption data from LSMS 2010.

1. Read weekly diary data from Section K (a table of items with the quantities consumed and cost associated with the item for every household).

   (a) All items that had no cost assciated with them were ignored (not included in total consumption)

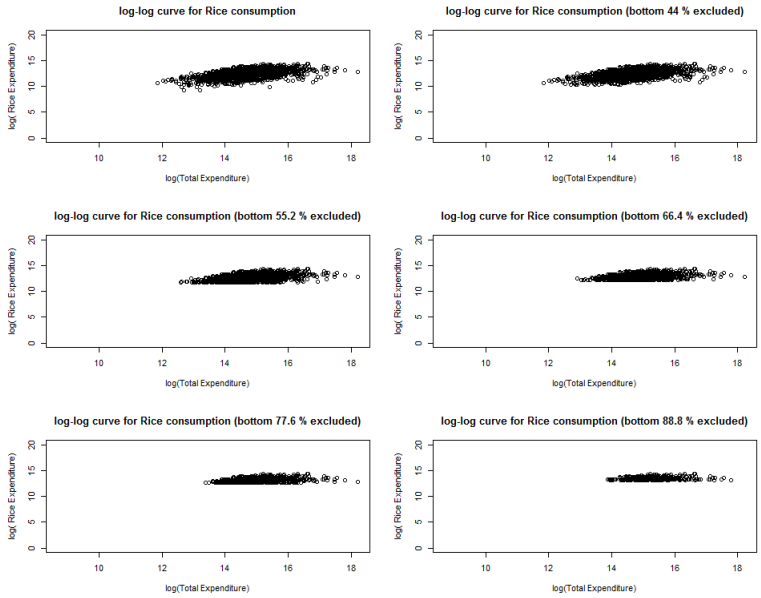

Figure 1: LSMS Tazanania 2010: Percentiles of nonzero consumption of rice

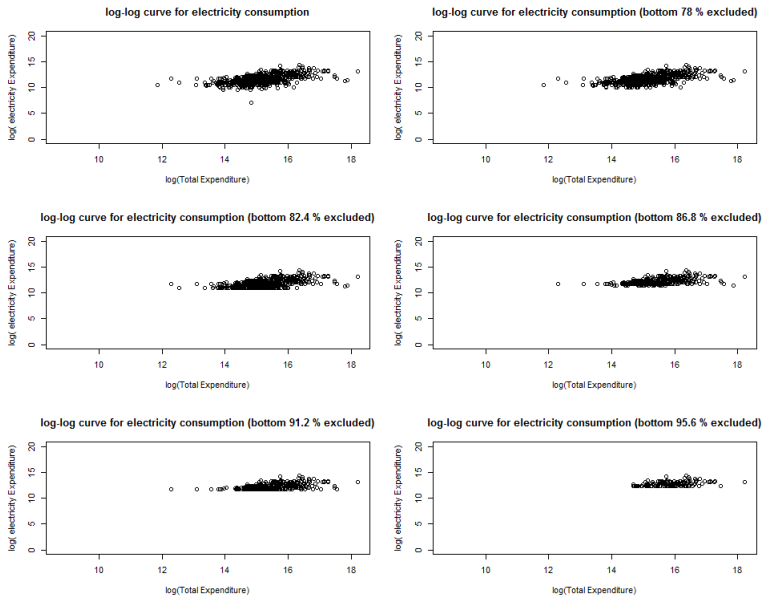

Figure 2: LSMS Tazanania 2010: Percentiles of nonzero consumption of electricity

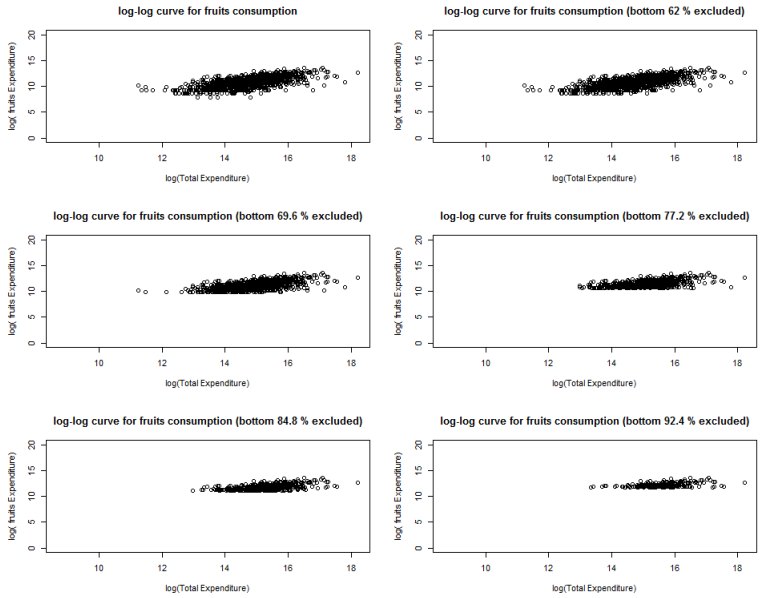

Figure 3: LSMS Tazanania 2010: Percentiles of nonzero consumption of fruits

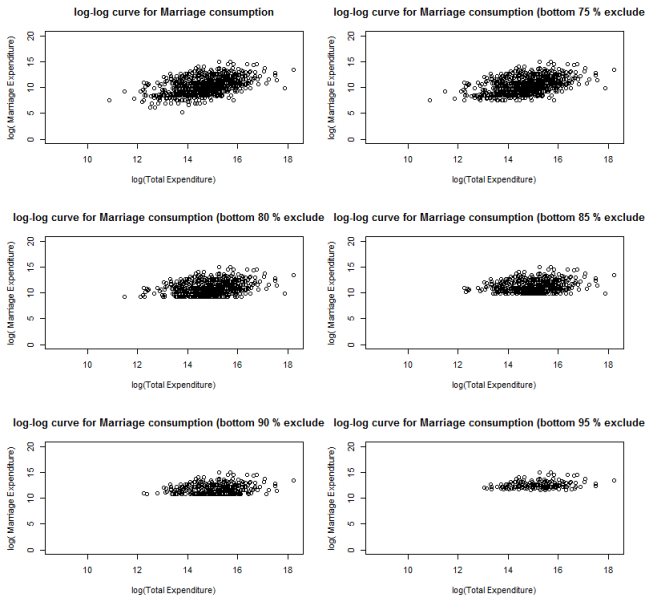

Figure 4: LSMS Tazanania 2010: Percentiles of non-zero expenditure on marriage

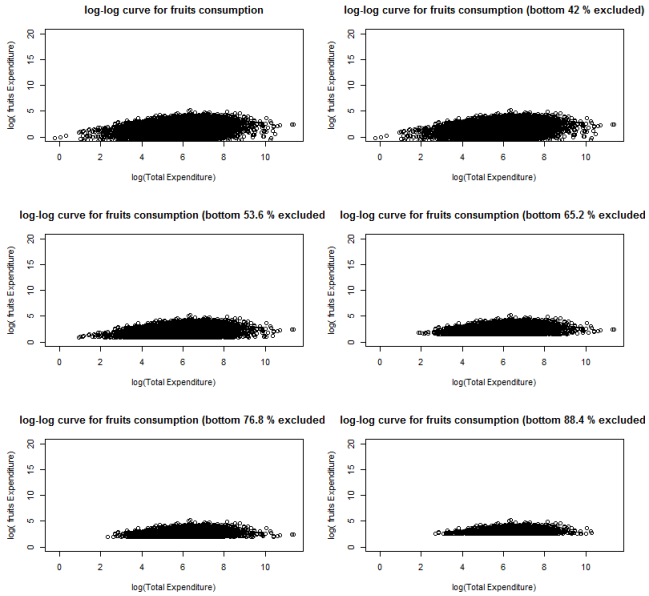

Figure 5: US CEX (2004,2010,2014): Percentiles of non-zero consumption of fruits

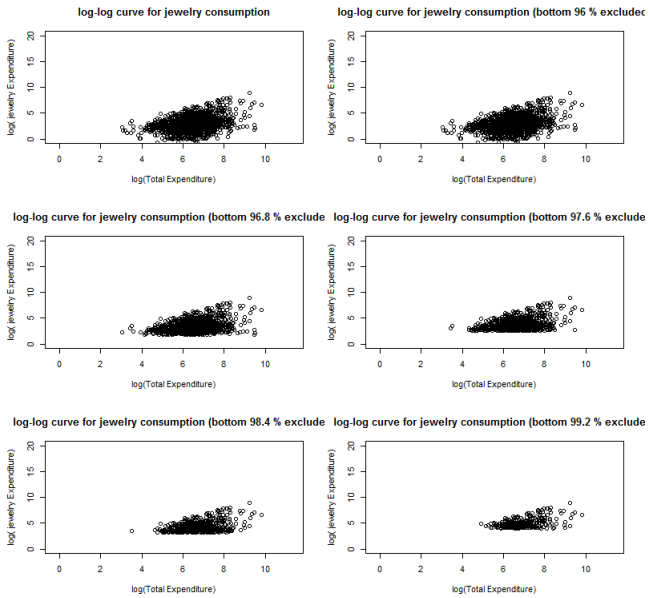

Figure 6: US CEX (2004,2010,2014): Percentiles of non-zero consumption of jewelry

(b) Gift quantities were ignored for consumption (median ratio of gift to total diary consumption was zero - only 132/3828 households had this ratio 1% or higher)

(c) Weekly diary data was multiplied by 52 (to estimate annual consumption)

i. Weekly recall items were also multiplied by 52 (to estimate annual consumption)

(d) Monthly recall items were multiplied by 12 (to estimate annual consumption)

(e) All expenditure from (c)-(e) above were summed up as total expenditure

2. Obtained Personal Data from Section A,B,C and J files

(a) Section C_CB was read to obtain market facilitycode and gauge the accessibility of a market in every district. The closest accessible market could be either within the district or outside the district at a given distance. If a market was within the the district or less than 10 kms away it was deemed "accessible". Urban/rural classifications based on population density could be inserted at this stage (population density in not available in LSMS).

(b) Read section B and C files

(c) Calculated age of member by subtracting YOB (year-of-birth) from 2010 (survey year)

(d) Read section J for housing data (total house rent, number of primary/secondary rooms)

3. Obtained income data from Section E (currently ignored for analysis for it being sparse). Here, the recorded pay frequency was in hours, days, weeks, months, fortnights, months, quarter, half year or year - while the mandatory fields corresponding to all of these units were i) number of hours worked per week ii) number of weeks worked per month and iii) number of months worked in an year .

(a) When pay was on a per-hour basis, the number of hours worked per week (provided) was multiplied with the number of weeks worked per month (provided). This product was then multiplied with the number of months worked per year (provided) to estimate the annual income.

(b) When pay was per-day, a 10 hour working day was assumed to obtain the effective number of work-days per week (based on the number of hours worked per week). This was then mutliplied with the number of weeks worked per month in the year and then further multiplied with the number of months worked in an year to obtain the estimated annual income.

(c) When pay was per week, the number of weeks worked per month was multiplied with the number of months worked per year.

(d) When pay was in fortnights, then twice the number of months worked in an year was used to calculate the total income received over the year.

(e) When pay was per-month, then the multiplication factor was just the number of months worked per year

(f) When pay was per-quarter, then the effective number of quarters were inferred from the number of months worked per year (number_of_months/3) and multiplied with the number of months worked per year to obtain the estimated annual income.

(g) For self-employed income, the work-months in an year was similarly used to compute total income from self-employment in the year

(h) All members less than 5 year old were ignored from the income data

(i) For wage workers:

i. summed up wages into column yearly pay

ii. summed up values under "other forms of payment"

iii. sum up values as secondary of payment (for wage-workers)

iv. only primary job was used to identify the employer type of the individual

v. added other wages from secondary job by summing up yearly-income from all sources into the yearly income

4. Ignored bad data (outliers)
   (a) Ignored 5 households with exceedingly high expenditure on marriage (more than reported annual income)
   (b) Ignored households in the income table but with zero income (number of households with income data thus ignored were under 2%)
5. Merged all data
   (a) Set education expense of houses with education expenses= NA as zero
   (b) Summed up educational expense and total house rent from personal data into total expenditure (both weren't a part of diary data)
   (c) Obtained personids of the house-heads and the following variables for household-head: education-level, age, years in community, language, occupation
   (d) Obtained visible expenditure by summing up expenditure on visible items
   (e) Merged all data into one table

11.2 Claims Tested

11.2.1 Effect of occupation

Income data in LSMS is not available for all the surveyed households. This may indicate the presence of informal sector in Tanzania. A few occupations in the survey are neither well defined nor are truly an indicator of total income. The presence of categories like unpaid-family-work and of individuals with no-primary-job getting a significant income from their secondary occupations makes the task of associating the primary occupation of the household head with her income rather difficult (i.e. occupation - which is available for all household heads cannot be used as a proxy of household income - which is not available for all households in the survey). Grouping the occupations into fewer categories than in the survey (by putting paid/unpaid family work and agriculture under the same category for example) allows for the smoothening of the effect of individual occupations and may serve as a proxy of socioeconomic classes in the country. Without or without this grouping, the effect of occupation has been found significant on the consumption of scarce commodities. The results are shown in Table 6.

11.2.2 Effect of Education Level

One of the claims to be evaluated on the LSMS data is whether education has a significant effect on visible consumption. If the education level of NA is considered as none (for nearly 30% of the recorded individuals), then highest education level of the household held is found quite significant for many commodities.

11.2.3 Effect of Immigration

With a significant migration from rural areas, one of the claims to be tested is whether those resident in the community spend less on positional consumption. While this does seem be to be a significant factor, it has a weaker effect than age or household size (which is to be further split as number of children and the number of members minus the number of children) .

11.2.4 Urbanization Effects

Most of Tanzania appears to be sparsely populated with little access to basic services and it is likely that the administrative classifications of rural-urban areas do not reflect the consumer markets so well. Still, "is_rural" dummy is found significant for house-rent and electricity (since most of rural Tanzania does not have electricity - See Table 6).

If one were to use a dummy for accessible markets (created using the distance from the surveyed household location to the closest daily market) - the effect of such a dummy is not so significant on positional consumption. The region dummies - on the other hand - are found to have more significance - indicating regional disparities for conspicuous consumption in the country.

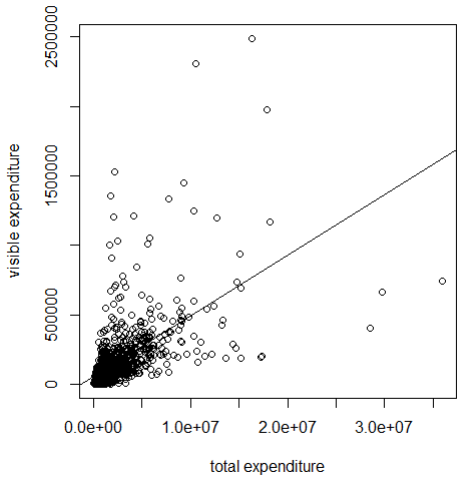

Figure 7: Visible Expenditure vs Total Expenditure for LSMS 2010

11.2.5 Population density

Population density is a crude measure for crowding in the cities. The regions with higher population density do have a slight effect on consumption of scarce commodities. It is hoped that a urban/rural dummy created by classifying districts based on their population densities (or at a finer granularity than regional levels) may give a more detailed view on the effect of population density on conspicuous consumption.

11.2.6 Services as Visible Consumption

One of the interesting observations in the Vindex survey (Heffetz[12]) is the clustering of services and products. It is found that services tend to be less "visible" in the Western consumer world. The clustering might not be as clear-cut in the developing world - where social stratification is severe and many services are contractual (non-monetary). The socio-cultural barriers might have an effect through access to services.

Towards that claim, English education as a control parameter is found quite significant for positional consumption. Those who identify themselves as English speakers tend to spend more on scarce commodities. This indicates that English education may be quite scarce - and while it isn't reflected in the consumer expenditure market data so easily - it's likely to play a role in status competitions.

11.3 Analysis and Discussion

Food is a significant portion of total spending overall [15]. More importantly, those in non-agrarian professions spend about as much of their total expenditure on food as those in agrarian occupations [16]. The other half of the expenditure is spent on housing, education and energy requirements as well as various household products[17].

While a commodity for private consumption (e.g. skin-cream or hobby-equipment in the LSMS data) might have an appeal for everyone - whether it is associated with high-income or not is a social psychological concern and cannot be assessed from the household survey by itself. In the absence of a visibility survey (asking the respondents how much they notice a product and whether they associate the product with high-income or not), one may still continue the discussion of the potential conspicuous value of items by looking at how scarce the item is (based on the percentile of consumers of the commodity). This is akin to

[15] 50% of those surveyed spend 60% or higher of their total expenditure on food - subject to estimation errors.

[16] The median ratio of food-expenditure to total expenditure for agrarian occupation households is 60% while for non-agrarian occupations the median is 57%. Around 54% of the total surveyed households were in agrarian occupations.

[17] Note that we may have slight errors in recording of food expenditure due to extrapolation of the weekly diary

repeating the analysis of visible expenditure with a given commodity as the only constituent of the visibility basket. The percentile of consumers using a given commodity (e.g. top 22% for electricity) and the slope of $log(commodity - expenditure)$ vs $log(total - expenditure)$ can tell us if richer sections of society spend more on a certain commodity and if the poorer sections of society consume the chosen commodity at all (the commodities chosen in the Table 5 are those where this slope is significant). The regression based on data prepared from the last step attempts to calculate the coefficients of the following equation:

$$ln(vis_i) = \beta_0 + \beta_1 \cdot Dem_i + \beta_2 \cdot ln(pInc_i) + \epsilon \tag{11}$$

Here vis_i is the total visible consumption of the household i (expenditure on a chosen commodity such as electricity, sports equipment), Dem_i is a vector of demographic indicators under consideration and $pInc_i$ is the permanent income - proxied by total expenditure - which has been instrumented using age, $cubic(age)$, $occupation$, $highest\_education$ level , $ln(highest\_education)$, $cubic(highest\_education)$ [18].

Table 5,6 and 7summarize the results obtained by running regressions on several commodity-categories. A column in the Table 5 also suggests the percentile of consumers using the commodity (electricity for example is used amongst those having top 22% of total expenditure). The usage of commodities such as skincream and other-personal-products (shampoos, razors etc.) are widespread compared with sports or hobby equipment and electricity. For commodities that are rare and consumed only amongst the richer sections of the society (those with higher total expenditure) the effect of English literacy is significant. Similarly, hsize has a significant effect on both educational expense and personal products (using number of children instead of hsize could provide better association with education expense).

We cannot claim from the results that the population spends more on status commodities than education. What we can claim however, is that electricity is more scarce than education. Further, in areas where food is expensive, spending on marriage reduces - particularly by the occupations that may bring higher incomes. This marks a preference towards industrial goods in the urban (expensive) areas.

Another observation that can possibly help in modeling scarcity is that scarcity of items seems to occur in clusters of objects. Carpets-rugs require a certain housing status and access to English depends on region. Similarly, many hobby equipments may require access to electricity etc. The clustering of these items essentially point to the urban-rural differences in the country.

[18] All 2sls regressions involved involved performing three diagnostic tests provided by the function ivreg of package AER in R. These tests are - i) a weak instrument test ii) a Wu-Hausman test for endogeneity and iii) a Sargan test for validity of instruments.

Commodity	Significant Variables	NonConsumer Percentile	Variables significant after lnpinc instrumentation
carpetsrugs	lnpinc, age, hsize, housingstatus, highest_educ, english	78	lnpinc, age,hsize, highest_educ, english
educexpense	lnpinc, age, hsize, housingstatus, occupation	35	lnpinc,age, hsize, housingstatus, occupation
electricity	lnpinc, age, hsize, housingstatus, occupation, isrural, highest_educ, region, english, is_resident	78	Chosen instruments (occupation, ln_highest_educ) did not demonstrate endogeneity of lnpinc
houserent	lnpinc, age, housingstatus, roomsnum	84	lnpinc, housingstatus
personal items repair	lnpinc, highest_educ, region	96	lnpinc, highest_educ, region
personal products	lnpinc, hsize, roomsnum, years_community	37	lnpinc, hsize, roomsnum, years_community
skin cream	lnpinc, age, hsize, isrural, region, years_community	12	lnpinc, age, hsize, region, years_community
funeral costs	lnpinc, region, roomsnum	54	lnpinc, region, roomsnum
marriage costs	lnpinc, region, english, roomsnum, years_community	75	lnpinc, region, english, roomsnum, years_community
sports and hobby equipment	lnpinc, age, housingstatus, region, english	93	lnpinc, age, housingstatus, region, english

Table 5: Results from regression over selected variables

Table 6: Regression for scarce commodities with no instrumentation

	Dependent variable: consumption									
	depvar									
	carpetsrugs(1)	education(2)	electricity(3)	houserent(4)	personalitemsrepair(5)	personalprods(6)	skincream(7)	funeral(8)	marriage(9)	hobbyequipment(10)
lnpinc	4.708***	3.574***	4.391***	1.154***	0.843***	3.439***	2.145***	2.759***	3.296***	1.214***
	(0.328)	(0.239)	(0.332)	(0.173)	(0.170)	(0.281)	(0.207)	(0.260)	(0.261)	(0.142)
age	−0.106***	0.086***	0.067***	−0.067***			−0.042***			−0.038***
	(0.023)	(0.017)	(0.020)	(0.011)			(0.015)			(0.010)
hsize	−0.459***	2.160***	−0.529***			−0.506***	0.217***			
	(0.115)	(0.089)	(0.102)			(0.104)	(0.067)			
housingstatus	0.600***	−1.049***	0.924***	4.280***						0.452***
	(0.208)	(0.187)	(0.191)	(0.131)						(0.106)
occupation_rank			0.782***							
			(0.295)							
isrural			−6.468***	−3.501***			1.469***			
			(0.642)	(0.419)			(0.465)			
highest_educ	−0.295***		0.421***		0.075**					
	(0.076)		(0.066)		(0.035)					
region			0.186***	−0.051***	−0.049***		−0.121***	−0.142***	−0.034**	−0.066***
			(0.017)	(0.011)	(0.010)		(0.012)	(0.018)	(0.016)	(0.009)
english	3.146***		2.949***						1.976**	1.633***
	(0.953)		(0.840)						(0.794)	(0.455)
roomsnum				−0.919***		0.442***		0.625***	0.654***	
				(0.100)		(0.169)		(0.157)	(0.146)	
is_resident			−1.956***	−1.977***						
			(0.558)	(0.366)						
years_community						−0.073***	−0.026**		−0.054***	
						(0.015)	(0.013)		(0.014)	
Constant	−71.251***	−64.314***	−85.424***	−31.269***	−33.945***	−47.620***	−21.851***	−46.797***	−61.169***	−36.167***
	(4.287)	(3.438)	(4.610)	(2.689)	(2.214)	(4.026)	(3.020)	(3.654)	(3.767)	(2.098)
Observations	2,240	2,965	2,240	2,965	2,240	2,965	2,965	2,965	2,963	2,963
R^2	0.126	0.322	0.437	0.502	0.029	0.084	0.094	0.059	0.101	0.073
Adjusted R^2	0.124	0.321	0.435	0.501	0.027	0.082	0.092	0.058	0.100	0.071
Residual Std. Error	13.394 (df = 2233)	13.463 (df = 2960)	11.595 (df = 2229)	8.929 (df = 2957)	7.386 (df = 2236)	14.919 (df = 2960)	10.078 (df = 2958)	15.518 (df = 2961)	13.840 (df = 2957)	7.963 (df = 2957)
F Statistic	53.824*** (df = 6; 2233)	351.136*** (df = 4; 2960)	173.281*** (df = 10; 2229)	426.503*** (df = 7; 2957)	21.953*** (df = 3; 2236)	67.429*** (df = 4; 2960)	51.003*** (df = 6; 2958)	61.522*** (df = 3; 2961)	66.629*** (df = 5; 2957)	46.343*** (df = 5; 2957)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 7: Instrumented Regression for scarce commodities

	Dependent variable:									
	lnvis	lndseducexpense	lnvis	lndshouserent			lnvis			
	carpetsrugs(1)	education(2)	electricity(3)	houserent(4)	personalitemsrepair(5)	personalprods(6)	skincream(7)	funeral(8)	marriage(9)	hobbyequipment(10)
lnpinc	4.665***	3.033***	9.941***	0.982**	0.747**	3.216***	1.661***	2.770***	3.446***	1.593***
	(0.657)	(0.597)	(1.247)	(0.432)	(0.321)	(0.565)	(0.502)	(0.484)	(0.627)	(0.318)
age	−0.106***	0.081***	0.055***	−0.074***			−0.040**			−0.060***
	(0.023)	(0.017)	(0.021)	(0.016)			(0.020)			(0.014)
hsize	−0.454***	2.227***	−1.182***			−0.518***	0.346***			
	(0.131)	(0.112)	(0.178)			(0.140)	(0.099)			
housingstatus	0.605***	−0.979***	1.028***	4.402***						0.491***
	(0.217)	(0.200)	(0.203)	(0.157)						(0.127)
occupation_rank			−0.723							
			(0.451)							
isrural			−3.861***	−3.618***			0.951			
			(0.883)	(0.585)			(0.626)			
highest_educ	−0.292***		0.132		0.084*					
	(0.089)		(0.094)		(0.044)					
region			0.187***	−0.057***	−0.049***		−0.106***	−0.138***	−0.054***	−0.076***
			(0.018)	(0.014)	(0.010)		(0.014)	(0.021)	(0.020)	(0.012)
english	3.155***		2.263**						2.253**	1.574***
	(0.962)		(0.903)						(0.984)	(0.577)
roomsnum				−1.020***		0.589***		0.412**	0.518***	
				(0.132)		(0.197)		(0.186)	(0.183)	
is_resident			−0.369	−2.191***						
			(0.684)	(0.494)						
years_community						−0.077***	−0.033*		−0.065***	
						(0.020)	(0.017)		(0.020)	
Constant	−70.746***	−56.921***	−156.675***	−28.337***	−32.733***	−44.482***	−15.511**	−46.113***	−62.420***	−40.656***
	(7.971)	(8.229)	(16.113)	(6.362)	(4.088)	(8.068)	(7.060)	(6.874)	(9.036)	(4.486)
Observations	2,240	2,965	2,240	2,240	2,240	2,240	2,240	2,240	2,240	2,240
R^2	0.126	0.321	0.367	0.502	0.028	0.069	0.080	0.043	0.090	0.078
Adjusted R^2	0.124	0.320	0.364	0.500	0.027	0.067	0.077	0.042	0.088	0.076
Residual Std. Error	13.394 (df = 2233)	13.474 (df = 2960)	12.299 (df = 2229)	9.500 (df = 2232)	7.386 (df = 2236)	14.768 (df = 2235)	9.766 (df = 2233)	15.740 (df = 2236)	14.286 (df = 2234)	8.484 (df = 2234)

Note: *p<0.1; **p<0.05; ***p<0.01

Part III
A Behavioural Model for Status Utility

12 A model for Utility and Status

The concept of status is rather non-trivial and has characteristics of a feedback system in the long-run (status may yield income through social barriers but requires income to be acquired). The Ireland model used in the literature treats status-signaling as purchasing of visible and non-visible goods[14]. In the Ireland model, the combined utility for every consumer is $U = F(f(v, w), s)$ where $f(v, w)$ is the private utility of the consumer and status s is assumed to be an increasing function of inference of others - $s = f(v, g(v))$ - with v denoting visual consumption and w - the consumption that is not directly observable. Every consumer thus optimizes the combined private and visible utility. A practical consideration in the model is the separation between visible and non-visible consumption - a boundary that requires a socio-culutral judgment and has been drawn using consumer surveys in the literature.

What research in the developing markets further points out is that the parameter of combined utility in a simplified model - $(U = (1 - a) \cdot f(v, w) + a \cdot f(v, g(v))$ - can vary for different sections of society. A slight adjustment of the model may be to add another parameter that indicates the consumer's social class. This may be relevant in the developing world where social status is yielded through social barriers. Sections of society that are endowed with a higher status capital may be in less of a need to purchase commodities of visible consumption.

In the analysis of LSMS data on Tanzania so far, urban/rural differences have significance in the consumption of scarce commodities. There are two ways to incorporate this into a model of signaling - one is to consider these household characteristics as a social class of consumers so that different visible sensitivities for social classes is noted. The other is to consider these characteristics as part of conspicious consumption in the long-run. For example, English literacy seems to have correlation with the consumption of certain scarce products in Tanzania. In the model of scarcity, English literacy (along with urban residence and other characteristics significant for consumption of scarce commodities) would be seen as a status commodity (capital) that is acquired through spending on education or migration (or other relevant commodities).

12.1 A Word of Caution

Notice that one needs to be careful while drawing conclusions based on consumption of commodities that are themselves selected based on the percentiles of consumption levels. The threshold method that we use to select scarce commodities (that are likely to be visible) - considers items that i) are accessible by no more than 50% of the consumers and ii) have their expenditure rising with permanent income. These are - by definition - items that the rich are more likely to afford. We cannot select items that the only richer section of society indulges in and claim that people spending on these selected items indicate higher status. Such a claim is only a restatement of the high permanent income and says nothing more substantial than that the richer population sections signal higher status. It would be a fallacy to associate visible consumption with household characteristics by only associating household characteristics with permanent income. The threshold method that we use only measures the "scarcity" of the item (e.g. electricity is more scarce than food) - not status or visibility per se - which involve some socio-cultural judgement. That scarcity itself has an indirect effect on status competitions cannot be denied - but this effect is not measured by the threshold method of classifying alone.

13 A model for scarcity and congestion

In recent decades, the urban settlements in Africa have seen massive overpopulation and development of the services sector. The differences in urban-rural lifestyles have increased. The scarcity of services and of industrial goods (which would be a necessity in the Western world) seem evidently sparse in the developing countries (a claim that is verified by data on Tanzania).

A relevant question amidst these developments is whether a consumer prefers a larger house over installation of electricity or not. As a commodity, electricity is both scarce and visible - as it opens up more lifestyle choices. A survey detailed in the next sections aims to test the presence of a preference for electricty (and other scarce goods) - but as is, the data suggests significant urban-rural differences across regions in Tanzania. In a Hirschian sense, a congestion [13] is likely to exist for electricity.

A general view on scarcity would allow us to classify the commodities based on their scarcity and quantify the urban-rural differences better. The survey detailed in next sections may further help measure the impact of such scarcities on consumer preferences. It is noted that many of the items are scarce together (carpets and housing-status, electricty and hobby equipments, etc.) . It is through such denial of goods and services that status perceptions develop. A simple view of observed scarcities can be provided by a directed graph of items for classification - where a node is an item and points to other nodes/items that it denies (which themselves can be formed with items that deny other items and so and so forth). For example, electricity can be a node in this graph with connections to equipments and electronics but no connection to food items. The disconnected nodes in the graph - would be least likely to be affected by another unreachable node in the graph. The criteria of connections (denials) would be determined by statistical significance e.g. rice and walnuts appear would not be scarce together if one of them is available and affordable by both higher and lower quantiles of permanent income of society.

14 A Behavioural Experiment for Status Competitions

14.1 Status and Consumption as games

Behavioural games have been used in the developing countries to gauge motivations of the participating consumers [19]. While the visibility surveys ([18, 12]) attempt to study how consumption on certain commodities may signal status, the goal of the proposed game is to characterise environments under which the perceptions of a higher-status may develop. The game attempts to emulate i) the consumer market and ii) the mechanism through which status may be assigned within a group of consumers. It therefore relies on participants playing the dual role of a consumer and status-observer.

The activities of purchasing and assigning status are separate in the game. Since a simulated purchase performed by the participants in the game (given a list of commodities, prices and outlay) is quite likely to deviate from their real world purchases and their real needs, the participants are instead asked what additional items they would purchase for a given a basket of commodities that they already possess (using a cumulative voting scheme that emulates selection of commodities in a market - see section 14.2 for details). The second part of the game emulates status assignment - where participants assign a score of status and effectiveness each to 3 (or more) other participants in the game by looking at the quantities of the item categories possessed and purchased by the latter. The judgment of status in the real world does not involve direct observance of prices and thus it is only the quantity of the identified items consumed or already possessed that matters in the status-assignment part of the game. The end-goal of the game is to purchase a basket most desired by others - the winner achieves this goal by purchasing commodities of her choice that are most desirable by everyone and are indicative of a rank higher than everyone else in the game.

14.2 Purchasing Mechanism

It is difficult for players to conduct a "simulated shopping" in a way that truly represents their needs. Hence, instead of asking the respondent how they'll spend the given outlay of a 1000 dollars over a set of commodities, they are asked how they would spend the additional 100 dollars for a given 1000 dollars of outlay (or more) value of items that they already have stocked up. The "stock" items can be chosen by the players as a first step in the game and is intended to match their own consumption pattern. While the "stock" is made of non-positional items, the participants choose 3 items from a mix of non-positional items and positional items - given the 10% extra outlay. Since all participants cannot be assumed to be equally numerate, the game uses a scheme similar to cumulative voting - where 10 virtual coins are provided to the participant and the participant is asked to distribute the coins amongst a set of available items (both positional and

[19] A study by Sophie Clot studies the effect high and low effort work on consumption by conducting an experiment at the payment office where some amount of pay is distributed for low-effort work and some for high-effort work.

non-positional). The provided outlay in the game (number of coins) may vary for participants - in proportion to the income distribution that is observed in the relevant consumption surveys (e.g. LSMS for Tanzania).

In summary the following steps are taken in the game:

1. Choose a stock basket that is closest to one's own consumption pattern (no more than 5 basket classifications are provided to choose from)
2. Acknowledge the real-life constraint (see Section 14.2.2)
3. Use the given additional outlay (10 or less virtual coins) to purchase and add (positional and well as non-positional items) to the strictly non-positional stock basket that was selected in the step 1[20]
4. Provide a score (1..5) on effectiveness and status to 3 other participants whose total outlay and the choice of items purchased (along with number of coins used for every item) is also known

14.2.1 Mixes in the Consumer Basket

While the basket for every consumer can be varied to model urban/rural differences or the distance /accessibility of the particular commodity classes, the game ensures that all participants have reasonably similar consumer universe. Consequently, no category is intended to be completely removed from the basket (i.e. all baskets have the same set of categories). Following are the categories for which the positional/non-positional variants are sought:

1. Food - Fruits, Meat, Baked Goods or Nuts/Cereals and Pulses, Milk (minor items such as salt and spices are not included), Tea, Soda/ Beer and Wine
2. Household products (Detergent, Electronics)
3. Personal Products (Clothes, Shoes, Makeup)
4. Household services (House refurbishments) and Energy (electricity/kerosene)
5. Savings for future Asset purchase
6. Entertainment/Dining Out/Travel/Travel Abroad
7. Health
8. Education (School/University)

14.2.2 Constraints and Assets

The game attempts to measure status and consumption with respect to high asset ownership, social class or familial responsibility. Since players choose between physical needs and positional needs in the game, a different circumstance is likely to affect their choice and hence their perceived status. The game presents a precondition to the player - indicating high asset ownership, a chosen social class or a familial liability. For example, to test a participant's choice between food and electricity, the game can present a large family as a constraint, and record the choice between spending more on food vs installing electricity. The game thus measures indirect effects of reward or constraints on status by allowing participants to gauge the suitability of a participant's choice in the status game in the presence of constraints (familial) or rewards (asset-related).

Notice that the constraint variable is only planned to be binary in the current scheme i.e. it is either a reward or a liability (when present). The two values are expected to have an opposite affect on the purchase of new items. Admittedly, the binary values of constraints vs rewards circumvent the difficulty in comparisons between disparate needs of the consumers - e.g. a large family, senior member or a social event (e.g. marriage/funeral). While a multivalued variable (if adopted) can potentially provide better insights into the relative effects of these several types constraints, the goal of the current exercise is to test for a direct effect of constraints on status (rather than relative effect of the various possible constraints).

[20] It is necessary to estimate the price of products and services for the purchasing game to emulate the market.

14.3 Status ranking

The status-ranking activity involves a student assigning a status score by looking at i) what the other participant with a given income level does with the extra outlay and ii) what the participant already possesses. In the ranking scheme, the participants provide a score on effectiveness as well as status to all the other (3 or more) participants observed. Notice that in presence of constraints specified in section 14.2.2, regardless of whether one is selfish or not, a participant would tend to penalise someone else who she thinks is going to be more selfish than herself. Since the game provides a way to penalize selfishness by status ranks, the participants are discouraged from indicating status through overspending on positional items. The penalty for not caring for a sick parent may be huge in the society but so can be the penalty for being stingy. Similarly, while some may want to indicate wealth by buying a watch they may also fear disrespect for not taking care of a sick family member. The scores on effectiveness and status are thus not only a way to discourage the consumer from limiting the unrealistic purchases in the simulated purchasing part of the game, they also track the effect of the externalities such as sickness or age (measured through the binary variable discussed in section 14.2.2).

While consumers try to maximise their utility by purchasing more items for a given limited outlay - they also manage their prestige by letting others have a better opinion of themselves. The status game can thus be seen as an enhanced version of the survey that asks people to imagine a neighbour who spends more than them on a chosen commodity (used in [18, 12]). The proposed game attempts to measure how consumers might act given a certain circumstances while both status and welfare (effectiveness score can be seen as a proxy of concern for others) become part of the payoff function in the game.

14.4 Welfare and Status competitions

The solution of this game for a set of rational players remains a pending exercise in this study. The key motivation for the analysis at this point is that fundamentally all social welfare concerns are concerns of Pareto optimality. Moreover, the payoff function for effectiveness in the game is meant to be a proxy for welfare.

With Pareto optimality in mind, more spending on education, health seems desirable - but it may be become distant for consumers due to their immediate needs - whether positional or non-positional. A comparison with what is observed in consumption data versus what is observed about positional consumption in games can provide some insight into the social status that can influence the desired welfare equilibrium.

14.5 Survey Questionnaire

You have 10,000 (or 100) to spend today. What are the objects that you would purchase if you were to enter the market today? Please take a look at the constraints that might affect your consumption. Try choosing the smartest way possible - the prices. You would also need to compare 2 other candidates as part of this game (as others would rate you). Try being close to your real circumstances. Unrealistic values may disqualify you from the game.

15 Policy implications

The discussion so far leans towards permitting status competitions rather than attempting to tax or control them. This is in line with the suggestions offered by Robert H Frank [9] favouring a non-monetary market of stauses only so that status games (which are a necessity) do not overlap with the market for real goods. Due to structural reasons of the modern economy, advertising efforts can turn a social scarcity into a physical scarcity (to use the Hirsch's terminology[13]). A profit-driven industry and the advertising pursued by the companies tend to increase the status competition for a commodity. Instead of letting status competitions modify the distribution of that physical goods through competition (and thus do little to avoid the problem of physical scrarcities in the developing countries), policy can attempt to provide status-games in a world of non-necessity items - in some ways to diffuse the status competitions in the society.

In poor and non-pecuniary societies, the desire to become rich or the benefit of inheriting money and education is often less reachable. Status and money translate into social securities in unstructured societies.

These may well be detected in the countries in Africa - but limited data on household characteristics in Tanzania (related to ethnicity or religion) have prevented us from such an analysis for Tanzania.

The question that we seek the answer for in the context of Tanzania (or another developing country) is whether the expenditure on high-status or scarce items (an analysis similar to one conducted by Prais Houthakker for expensive and cheap tea varieties amongst social classes in the UK[22]) - is actually more desirable than on housing and education. The designed experiment intends to find answer to this question. If the answer is indeed the former, then it makes sense to limit the status competitions through policy to support status competitions on non-essential items (possibly by introducing brand differentiation). Attaching glamour to education, healthcare and food items may help consumers prioritize their needs.

Part IV
Effect of Price on food vs non-food items

16 Price Changes

The literature has not used panel data analysis in the context of conspicuous consumption. While an influence of rising prices can complicate the analysis of visible consumption indicators, the insights from demand elasticities are essential to understanding the relative effect of status-related consumption against other commodities. Higher price of food items may suppress consumption on food - but one cannot answer whether an increase in price of food suppresses its consumption more than it suppresses consumption of non-food items or not - without an estimation of demand elasticities. Such details of consumption patterns are basket-dependent and are not accessible without a record of prices of all types of items in the basket. Unfortunately, a lack of prices for non-food items in the LSMS prevent this much desired time-series analysis.

Even though an analysis on non-food prices is inaccessbile with the unavailability of price data in most consumption surveys (e.g. LSMS), a time-series analysis based on food prices alone can provide insights into the pressures on food consumption. Using historical prices on calorie consumption in India, Deaton and Jean Dreze point out that the overall calorie consumption has declined while the total outlay has increased in India ([8]). The change in positional value of food - determined by price differentiation in the market and scarcity - can potentially help explain some of this decline. While such a decline is reported to be less in the case of sub-Saharan African countries than in India, the regional differences within the country could be explained by the change of food's position in the consumer universe (i.e. the so-called "Sen argument"[8]).

Congestion - a related phenomenon - is subject to demand and supply for a particular commodity and can be measured. If we were to consider food, for example, a limited supply and overpopulation can increase competition. Similarly, for entertainment, censorship and introduction of internet can create new competitions (congestion). For housing, new constructions and overpopulation can cause congestion. These are commodity-specific instances and a focus on selected items may be the only way to test whether the changes in consumption patterns for the chosen commodity are explained by new scarce items and the competition caused for them. The data from Tanzania - so far - only seems to point that availability of services in urban and rural area can potentially cause some congestion (competitions for scarce items).

17 Food prices from LSMS - a preliminary analysis

Scarcity is interpreted in terms of availability and affordability in the study. The geographical regions may need to be understood in terms of scarcity. Further, population density and migration data may provide better insights in the interplay of food and non-food consumption.

It is noted that in certain areas in Tanzania - prices for food vary a lot more than they do in others. This is a phenomenon that varies from commodity to commodity. For example, the prices for onions and sugar don't vary so much by area code as they do for meat and chicken. The regions Dar-es-salaam, Mbeya mwanza, Mjini/Magharini unguja stand out for higher prices for multiple items. In a preliminary analysis, a indicator dummy for these regions is found significant - but it is also noted that these areas are urban settlements where electricity is available and population is significantly high (See Table 8).

Certain food items for example, have more price-differences overall than others - rice (husked), maize(grain), sweet potatoes, Irish potatoes, groundnuts(shelled), goat meat, chicken and canned milk correspond to numerous (>4) region-codes where they're reportedly sold in different prices ranges. While it is tempting to claim that price differences in the market indicate that there is more price-differentiation and possibly more competition - one needs to consider the overall scarcity of the commodity (the percentiles of the commodity expenditure in the threshold method) as well as the preference for the item amongst the rich (measured by higher expenditure with income) for the item to be considered a status-signaling item.

Table 8: No instruments regression with population density and expensive-food dummy included

	Dependent variable:									
	depvar									
	carpetsrugs(1)	education(2)	electricity(3)	houserent(4)	personalitemsrepair(5)	personalprods(6)	skincream(7)	funeral(8)	marriage(9)	hobbyequipment(10)
lnpinc	5.095***	3.979***	3.940***	0.991***	0.667***	3.439***	1.894***	1.644***	2.494***	1.017***
	(0.365)	(0.269)	(0.342)	(0.171)	(0.128)	(0.281)	(0.253)	(0.322)	(0.275)	(0.159)
age	−0.114***	0.086***		−0.070***			−0.042**		−0.036**	−0.043***
	(0.023)	(0.017)		(0.011)			(0.019)		(0.017)	(0.010)
hsize	−0.522***	2.109***	−0.404***			−0.506***	0.285***			
	(0.116)	(0.090)	(0.104)			(0.104)	(0.082)			
housingstatus	0.675***	−0.923***	0.871***	4.250***	0.191**					0.413***
	(0.213)	(0.190)	(0.192)	(0.131)	(0.091)					(0.111)
occupation_rank			1.012***					−0.681**		
			(0.296)					(0.320)		
isrural			−3.120***	−3.952***						
			(0.660)	(0.410)						
highest_educ	−0.284***		0.472***				−0.120**			
	(0.075)		(0.067)				(0.047)			
expensiveregion			3.354***						−1.517**	−1.331***
			(0.751)						(0.764)	(0.449)
popdensity	−0.001***	−0.001***	0.001***		0.0002*			0.003***	0.003***	0.001***
	(0.0003)	(0.0002)	(0.0003)		(0.0001)			(0.0003)	(0.0003)	(0.0002)
english	2.822***		4.425***						1.913**	1.132**
	(0.951)		(0.840)						(0.774)	(0.453)
years_community			0.094***			−0.073***	−0.036**			
			(0.020)			(0.015)	(0.015)			
roomsnum				−0.915***		0.442***		0.923***	0.936***	
				(0.101)		(0.169)		(0.166)	(0.150)	
is_resident	−1.873***		−2.607***	−2.113***						−0.683**
	(0.650)		(0.732)	(0.366)						(0.335)
Constant	−74.486***	−69.443***	−81.732***	−29.257***	−31.468***	−47.620***	−17.262***	−35.574***	−52.757***	−33.680***
	(4.891)	(3.771)	(4.640)	(2.666)	(1.794)	(4.026)	(3.271)	(4.281)	(3.857)	(2.368)
Observations	2,240	2,965	2,240	2,965	2,965	2,965	2,240	2,965	2,963	2,963
R^2	0.135	0.324	0.427	0.499	0.020	0.084	0.056	0.063	0.120	0.062
Adjusted R^2	0.132	0.323	0.424	0.498	0.019	0.082	0.054	0.062	0.118	0.060
Residual Std. Error	13.331 (df = 2231)	13.441 (df = 2959)	11.705 (df = 2228)	8.962 (df = 2958)	6.939 (df = 2961)	14.919 (df = 2960)	9.888 (df = 2234)	15.481 (df = 2960)	13.698 (df = 2956)	8.010 (df = 2955)
F Statistic	43.602*** (df = 8; 2231)	283.994*** (df = 5; 2959)	150.867*** (df = 11; 2228)	490.157*** (df = 6; 2958)	20.278*** (df = 3; 2961)	67.429*** (df = 4; 2960)	26.536*** (df = 5; 2234)	50.102*** (df = 4; 2960)	67.163*** (df = 6; 2956)	27.977*** (df = 7; 2955)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 9: Instrumented regression with population density and expensive-food

	Dependent variable:									
	lnvis	lndseducexpense	lnvis	lndshouserent			lnvis			
	carpetsrugs(1)	education(2)	electricity(3)	houserent(4)	personalitemsrepair(5)	personalprods(6)	skincream(7)	funeral(8)	marriage(9)	hobbyequipment(10)
lnpinc	5.814***	4.758***	10.958***	0.635	0.988***	3.216***	0.982	1.828**	1.465*	2.074***
	(1.149)	(1.010)	(1.512)	(0.425)	(0.302)	(0.565)	(0.612)	(0.902)	(0.781)	(0.705)
age	−0.115***	0.092***		−0.077***			−0.029		−0.044*	−0.037***
	(0.023)	(0.018)		(0.016)			(0.021)		(0.023)	(0.011)
hsize	−0.607***	2.011***	−1.248***			−0.518***	0.383***			
	(0.173)	(0.152)	(0.209)			(0.140)	(0.102)			
housingstatus	0.657***	−0.951***	1.091***	4.363***	0.163					0.471***
	(0.215)	(0.194)	(0.214)	(0.157)	(0.109)					(0.118)
occupation_rank			−0.660					−1.030**		
			(0.475)					(0.485)		
isrural			−0.763	−4.273***						
			(0.872)	(0.557)						
highest_educ	−0.330***		0.134				−0.045			
	(0.102)		(0.101)				(0.066)			
expensiveregion			3.131***						−1.465	−1.433***
			(0.820)						(0.908)	(0.457)
popdensity	−0.001***	−0.001**	0.0002		0.0002			0.003***	0.003***	0.0003
	(0.0004)	(0.0005)	(0.0004)		(0.0002)			(0.0004)	(0.0004)	(0.0003)
english	2.659***		3.306***						2.879***	0.243
	(0.983)		(0.945)						(0.996)	(0.736)
years_community			0.094***			−0.077***	−0.054***			
			(0.022)			(0.020)	(0.018)			
roomsnum				−1.001***		0.589***		0.729***	0.962***	
				(0.133)		(0.197)		(0.227)	(0.196)	
is_resident	−1.655**		−1.151	−2.425***						−0.324
	(0.730)		(0.854)	(0.492)						(0.410)
Constant	−83.338***	−79.925***	−171.528***	−23.645***	−35.904***	−44.482***	−6.160	−36.943***	−38.454***	−48.819***
	(14.297)	(13.633)	(19.424)	(6.290)	(4.260)	(8.068)	(7.528)	(11.996)	(10.595)	(10.115)
Observations	2,240	2,965	2,240	2,240	2,240	2,240	2,240	2,240	2,240	2,963
R^2	0.134	0.322	0.318	0.496	0.020	0.069	0.051	0.054	0.106	0.048
Adjusted R^2	0.131	0.321	0.315	0.495	0.019	0.067	0.048	0.053	0.104	0.046
Residual Std. Error	13.343 (df = 2231)	13.460 (df = 2959)	12.765 (df = 2228)	9.550 (df = 2233)	7.418 (df = 2236)	14.768 (df = 2235)	9.917 (df = 2234)	15.652 (df = 2235)	14.160 (df = 2233)	8.070 (df = 2955)

Note: *p<0.1; **p<0.05; ***p<0.01

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