Part I
Scarcity and Visible Consumption (contd.)

1 Detecting and measuring positional consumption

1.1 Measures for Scarcity [5]

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 [7] 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[9]).

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 1.3 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.

1.2 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.

1.3 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, 4]).

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).

2 Analysis of LSMS Data

2.1 Steps in preparing LSMS data (2010)

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

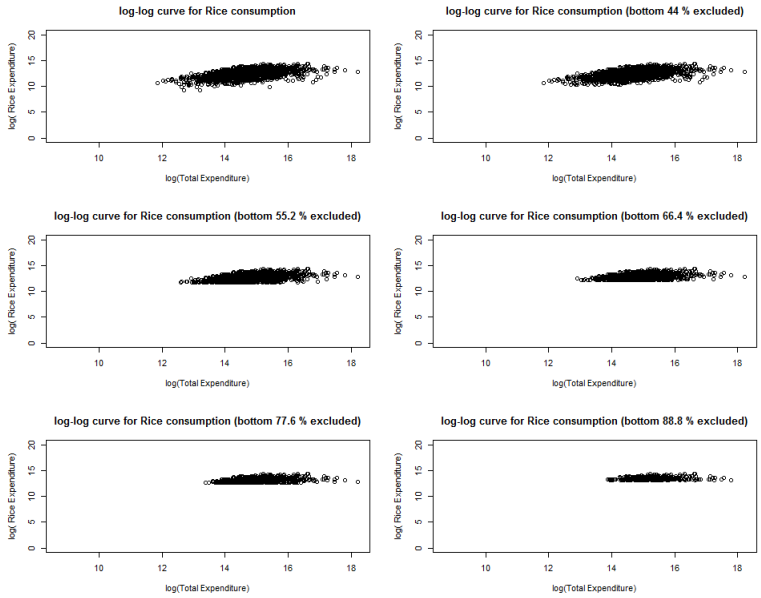

Figure 1: LSMS Tazanania 2010: Percentiles of nonzero consumption of rice

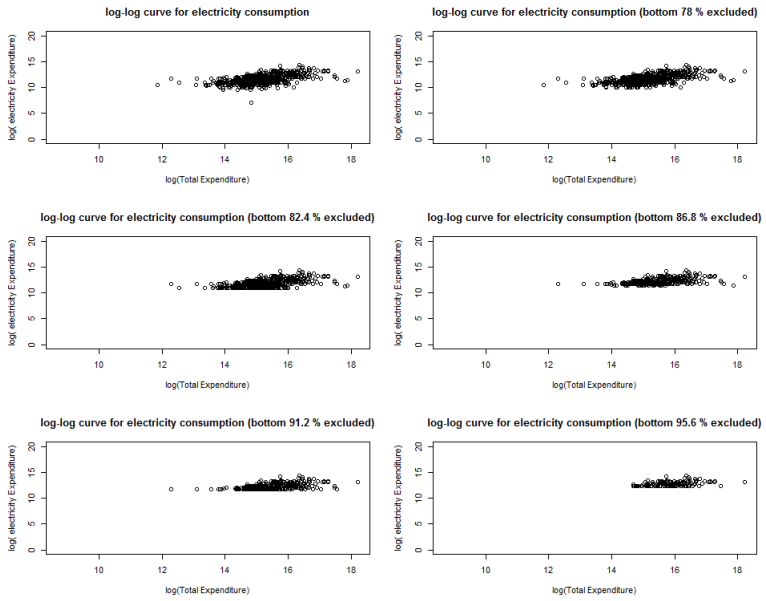

Figure 2: LSMS Tazanania 2010: Percentiles of nonzero consumption of electricity

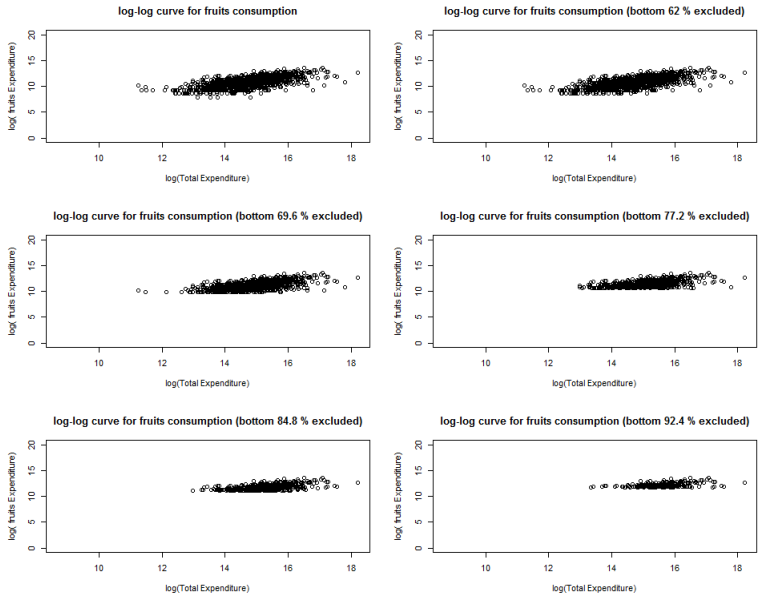

Figure 3: LSMS Tazanania 2010: Percentiles of nonzero consumption of fruits

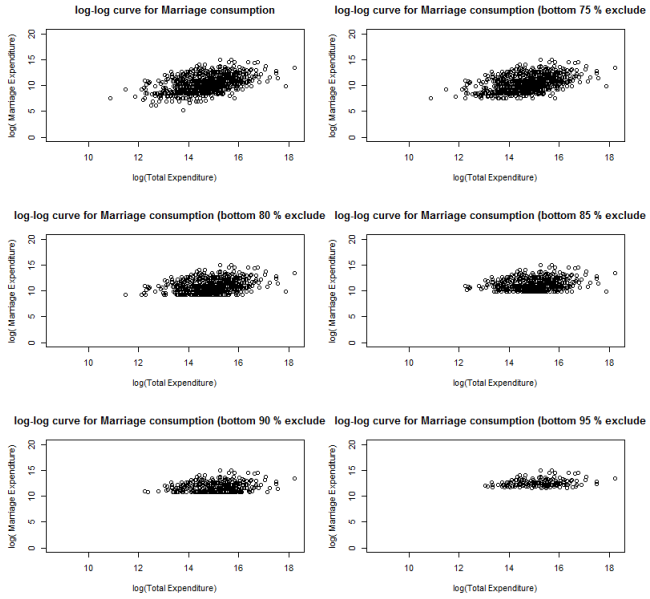

Figure 4: LSMS Tazanania 2010: Percentiles of non-zero expenditure on marriage

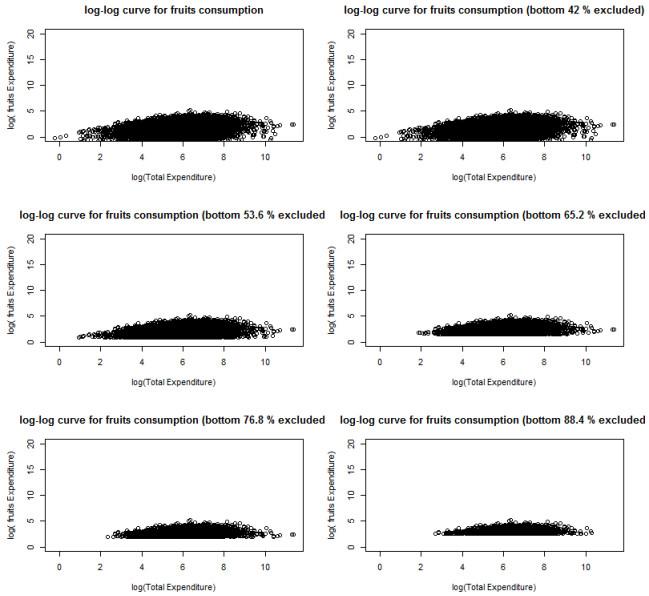

Figure 5: US CEX (2004,2010,2014): Percentiles of non-zero consumption of fruits

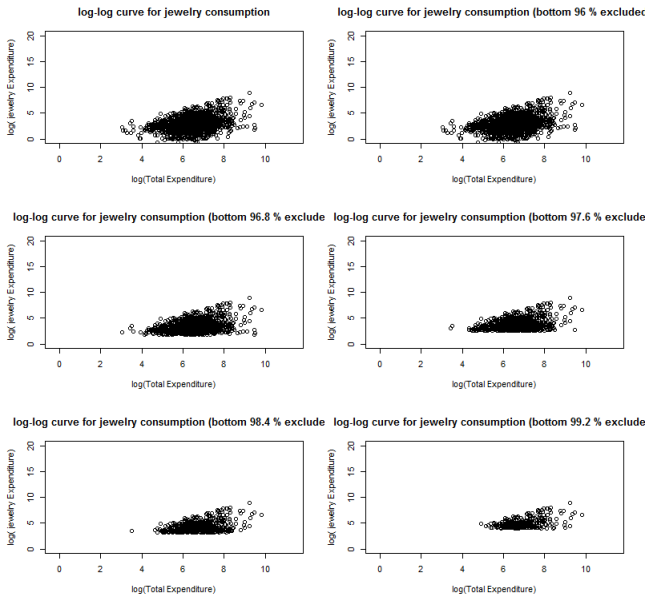

Figure 6: US CEX (2004,2010,2014): Percentiles of non-zero consumption of jewelry

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)

   (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

2.2 Claims Tested

2.2.1 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 2.

2.2.2 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.

2.2.3 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) .

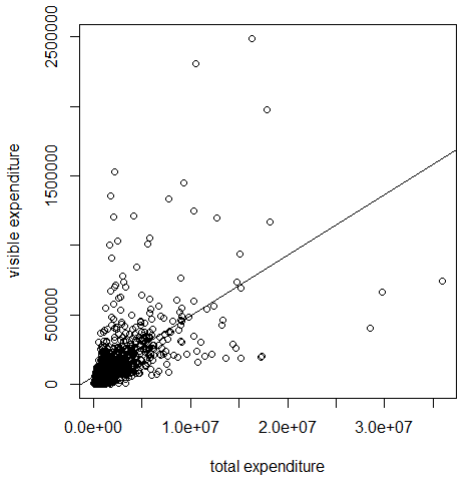

Figure 7: Visible Expenditure vs Total Expenditure for LSMS 2010

2.2.4 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 2).

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.

2.2.5 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.

2.2.6 Services as Visible Consumption

One of the interesting observations in the Vindex survey (Heffetz[4]) 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.

2.3 Analysis and Discussion

Food is a significant portion of total spending overall [1]. More importantly, those in non-agrarian professions spend about as much of their total expenditure on food as those in agrarian occupations [2]. The other half of the expenditure is spent on housing, education and energy requirements as well as various household products[3].

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 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 1 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:

$$ln(vis_i) = \beta_0 + \beta_1 \cdot Dem_i + \beta_2 \cdot ln(pInc_i) + \epsilon \tag{1}$$

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 , $ln(highest\_education)$, $cubic(highest\_education)$ [4].

Table 1,2 and 3summarize the results obtained by running regressions on several commodity-categories. A column in the Table 1 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.

[1] 50% of those surveyed spend 60% or higher of their total expenditure on food - subject to estimation errors.

[2] 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.

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

[4] 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 1: Results from regression over selected variables

Table 2: 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 3: 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 II
A Behavioural Model for Status Utility

3 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[6]. 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).

3.1 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.

4 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 [5] 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.

5 A Behavioural Experiment for Status Competitions

5.1 Status and Consumption as games

Behavioural games have been used in the developing countries to gauge motivations of the participating consumers [5]. While the visibility surveys ([7, 4]) 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 5.2 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.

5.2 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

[5] 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 5.2.2)
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[6]
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

5.2.1 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)

5.2.2 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).

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

5.3 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 5.2.2, 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 5.2.2).

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 [7, 4]). 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.

5.4 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.

5.5 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.

6 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 [3] 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[5]). 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[8]) - 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 III
Effect of Price on food vs non-food items

7 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 ([2]). 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"[2]).

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).

8 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 4).

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 4: 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 5: 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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